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Section A

Body Control System Description and Operation

The body control system consists of the body control module (BCM), communications, and various input and outputs. Some inputs, outputs and messages require other modules to interact with the BCM. The BCM also has discrete input and output terminals to control the vehicle's body functions. The BCM is wired to the high speed GMLAN serial data bus, low speed GMLAN serial data bus and Multiple LIN buses and acts as a gateway between them.

Power Mode Master

This vehicle body control module (BCM) functions as the power mode master (PMM). The ignition switch is a low current switch with multiple discrete ignition switch signals to the PMM for determining the power mode that will be sent over the serial data circuits to the other modules that need this information; the PMM will activate relays and other direct outputs of the PMM as needed. Refer to Power Mode Description and Operation for a complete description of power mode functions.

Gateway

The body control module (BCM) in this vehicle functions as a gateway or translator. The purpose of the gateway is to translate serial data messages between the GMLAN high speed bus and the GMLAN low speed bus for communication between the various modules. The gateway will interact with each network according to that network's transmission protocol.

All communication between the BCM and a scan tool is on the high speed GMLAN serial data circuits. A lost communication DTC typically is set in modules other than the module with a communication failure.

Body Control

The various body control module (BCM) input and output circuits are illustrated in the corresponding functional areas on the BCM electrical schematics. Refer to the Body Control System Schematics for more detailed information.

Power Mode Description and Operation

Serial Data Power Mode Master

Power to many of this vehicles circuits is controlled by the module that is designated the power mode master. This vehicles power mode master is the body control module (BCM). The BCM has multiple B+ circuits that feed into it. Each of those circuits are partitioned within the controller to drive certain outputs of the vehicle's body functions. An open or short in any one of the B+ circuits may induce multiple codes/or a section of non-functionality within the BCM with the rest of the BCM functioning normally. In this case it is useful to refer to the power distribution schematics to determine if the non-functional partition of the controller shares a common B+ circuit. The ignition switch is a low current switch with multiple discrete ignition switch signals to the power mode master for determination of the power mode that will be sent over the serial data circuits to the other modules that need this information. The power mode master will also activate relays and other direct outputs of the power mode master as needed. The power mode master determines which power mode (Off, Accessory, Run, Crank Request) is required, and reports this information to other modules via serial data. Modules which have switched voltage inputs may operate in a default mode if the power mode serial data message does not match what the individual module can see from its own connections.

The power mode master receives ignition switch signals to identify the operators desired power mode. The Power Mode Parameter tables below illustrate the correct state of these input parameters (circuits) in correspondence to the ignition switch position:

Power Mode Parameters				
Ignition Switch Position	**Power Mode Transmitted**	**Ign. Off/Run/Crank (Off/Run Crank Voltage Circuit)**	**Ignition Accessory/Run (Accessory Voltage Circuit)**	**Ignition Run/Crank (Ignition 1 Voltage Circuit)**
Off Key Out	Off	Key Out / ACC	Inactive	Inactive
Off Key IN	Off	Key In / Off	Inactive	Inactive
Accessory	Accessory	Key Out / ACC	Active	Inactive
Run	Run	Run	Active	Active
Start	Crank Request	Crank	Inactive	Active

Relay Controlled Power Mode

The BCM uses the discrete ignition switch inputs Off/Run/Crank Voltage, Accessory Voltage, and Ignition 1 Voltage, to distinguish the correct power mode. The BCM, after determining the desired power mode, will activate the appropriate relays for that power mode.

The retained accessory power relay 1 and retained accessory power relay 2 remain on for a timed period after the Ignition key is removed. Refer to Retained Accessory Power Description and Operation for more information on the retained accessory power function.

Battery Saver Mode (Transport Mode)

Battery saver mode (transport mode) reduces the parasitic load of some modules during overseas shipment or during vehicle storage conditions. This improves the drain time on the battery (up to 70 days without the battery going dead). When a vehicle is in transport/storage, some features may have reduced functionality while in the battery saver mode, such as disabling keyless entry, after-blow, and content theft features. Battery saver mode is initiated by turning on the hazard flashers, applying the brake pedal, and then turning the ignition key to the start position or pushing the ignition mode switch with the foot on the brake for greater than 15 seconds. The mode is disengaged by repeating the previous process. The driver information center (if equipped) will display Transport Mode is On when battery saver mode is enabled and Transport Mode is Off when battery saver mode is disabled. For vehicles not equipped with a driver information center, the battery indicator light will constantly flash on the Instrument Cluster when battery saver mode is enabled. This feature can be used as many times as necessary if the vehicle is to be stored for an extended period of time.

BCM Awake/Sleep States

The BCM is able to control or perform all of the BCM functions in the awake state. The BCM enters the sleep state when active control or normal monitoring of system functions has stopped and a time limit has passed. The BCM must detect certain wake-up inputs before entering the awake state. The BCM monitors for these inputs during the sleep state.

The BCM will enter the awake state if any of the following wake-up inputs are detected:

- Activity on the serial data line
- Detection of a battery reconnect

- Any door open signal
- Headlamps ON
- Key-in-ignition
- Ignition ON
- Park lamps ON
- Keyless entry or remote start message

The BCM will enter a sleep state when all of the following conditions exist:

- The ignition switch is OFF, key out.
- Ignition OFF, transmitter is out of range
- No activity exists on the serial data line.
- No outputs are commanded.
- No delay timers are actively counting.
- No wake-up inputs are present.

If all these conditions are met, the BCM will enter a low power or sleep condition.

Retained Accessory Power

RAP Description and Operation

The Body Control Module (BCM) monitors the ignition switch position, battery condition, and each door ajar/open switch status to determine whether the retained accessory power should be initiated or terminated. Retained accessory power is controlled by two different methods; relay control and serial data. Some modules receive a retained accessory power message from the BCM over the serial data circuits. Serial data controlled retained accessory power is deactivated as required by their modules retained accessory power mode operation. Other subsystems are activated directly by the BCM through a relay. Components and systems that are active in retained accessory power are also activated anytime the ignition is any position other than OFF regardless of the door switch signals.

Relay Controlled Retained Accessory Power

The BCM keeps the retained accessory power relay 1 and retained accessory power relay 2 energized during all power modes, except Off-Awake and Crank. The retained accessory power relay 1 and retained accessory power relay 2 are also energized for approximately 10 minutes after shutting the ignition OFF and removing the key, providing no door is opened.

Relay controlled retained accessory power will end when one of the following conditions is met:

- The BCM receives an input from any door ajar or open switch indicating the opening of any door after the ignition key is out of the ignition.

  Note: If the BCM is receiving any door ajar or open signal from those switches when the ignition key is turned OFF, retained accessory power will not initiate.

- The BCM internal timer for the retained accessory power expires after approximately 10 minutes.
- The BCM detects a decrease in battery capacity below a prescribed limit.

Relay Controlled Retained Accessory Power (continued)

Systems powered by the retained accessory power relay 1 and retained accessory power relay 2 during the retained accessory power mode are as follows:

Note: The vehicle may not be equipped with all components as listed below.

- Accessory Power Receptacle
- Cigarette Lighter Receptacle
- Sunroof Control Module
- Sunroof Switch
- Sliding Rear Window Switch
- Mobile Device Wireless Charger Module

Serial Data Controlled Retained Accessory Power

Retained accessory power systems controlled by serial data are as follows:

Radio:
Radio retained accessory power activation / termination is the same as relay operation with one exception; the only door switch that will turn off the radio during retained accessory power is the driver door open switch.
Vehicle Communication Interface Module (VCIM) (Onstar®) (If Equipped)

VCIM RAP activation/termination is the same as radio operation with 1 exception; if there is an active call when the ignition key is turned off the VCIM will remain in RAP mode, and keep the radio in RAP mode until the call is terminated.

Back-up Alarm and Camera

For installation of a Back-up Alarm/Camera on vehicles not equipped with 8S3 (factory back-up alarm) connections can be made at the rear body junction block (X63A).

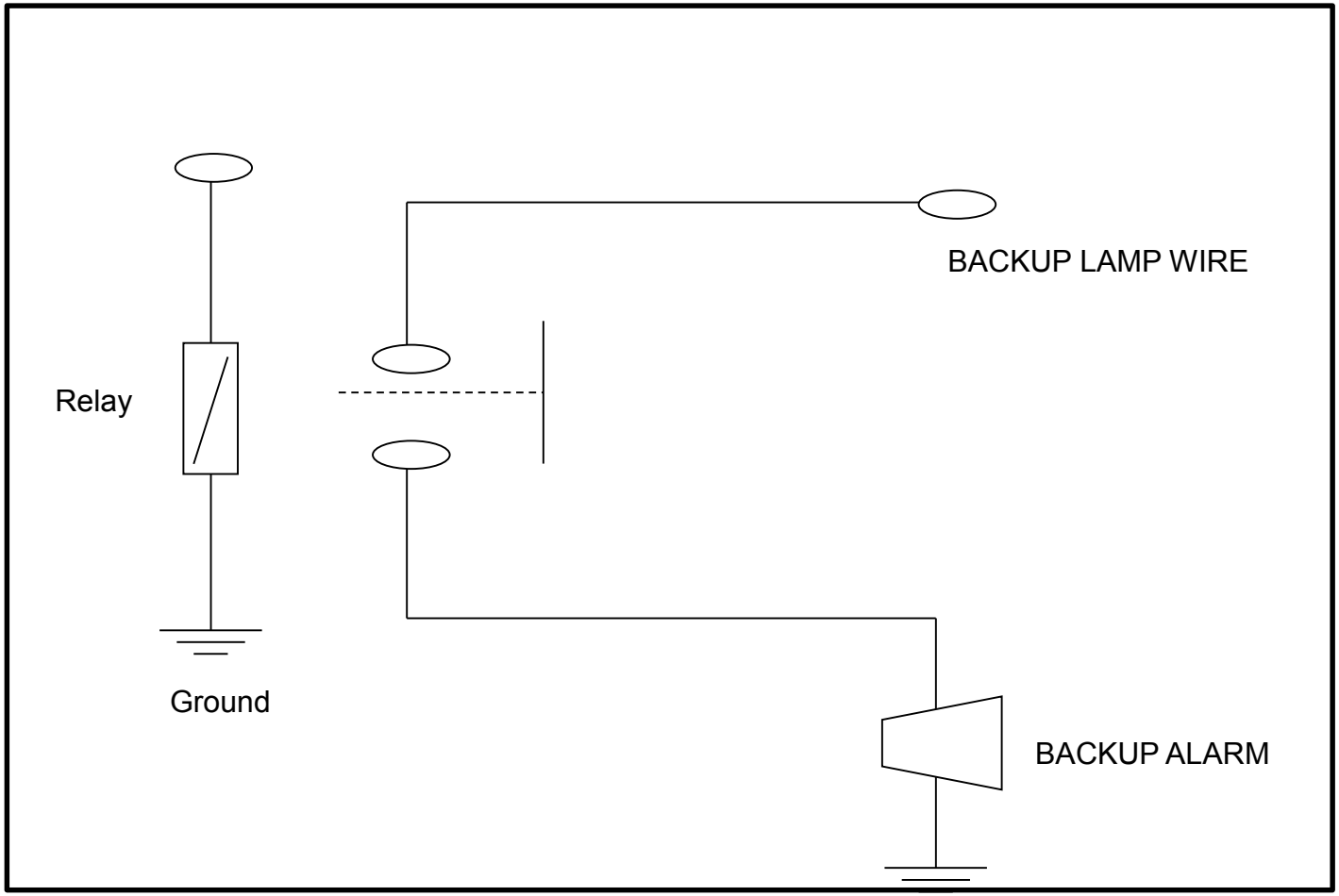
In addition to when the vehicle is operated in reverse, the back-ups are illuminated during a lighted exit and as a key fob acknowledgement. When using the back –lamps circuit to activate a back-up alarm, in which the perimeter lighting feature is set to ON for exiting, the back-up alarm will be activated during the exit lighting event. To prevent this undesired alarm (or camera) activation during the exit lighting mode use one of the two options listed below…

1. Have the vehicle' BCM (Body Control Module) reprogramming with a new calibration that includes RPO (regular production Option) code SFW. This option will suppress the activation of the Back-up lamps during the exit lighting mode operation.

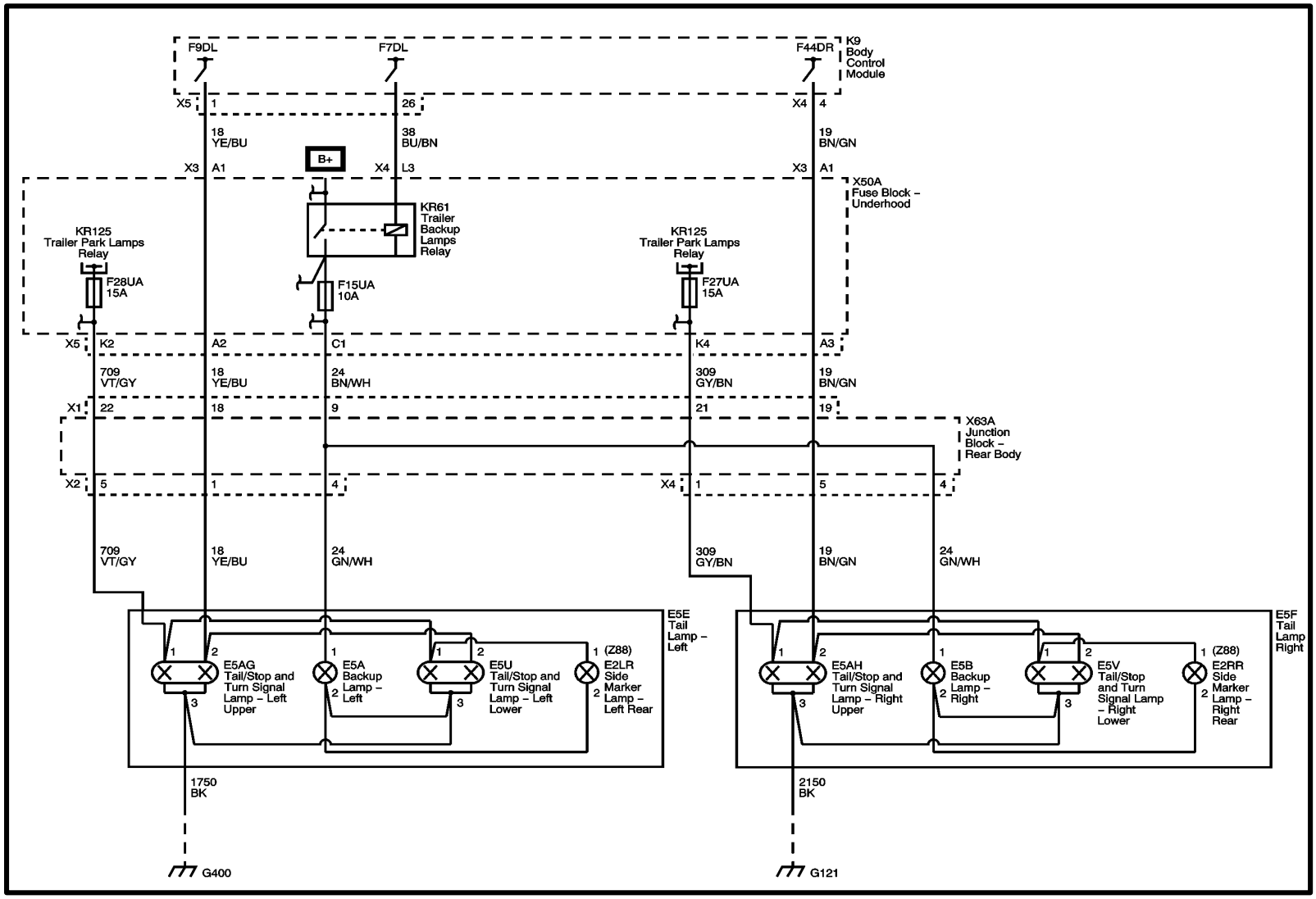
OR

2. Install an ignition controlled relay to which only allows for the Back-up lamp signal to be provided to the alarm/camera if the ignition is in the "RUN" mode, and the vehicle is being operated in reverse mode. (see sample schematic)

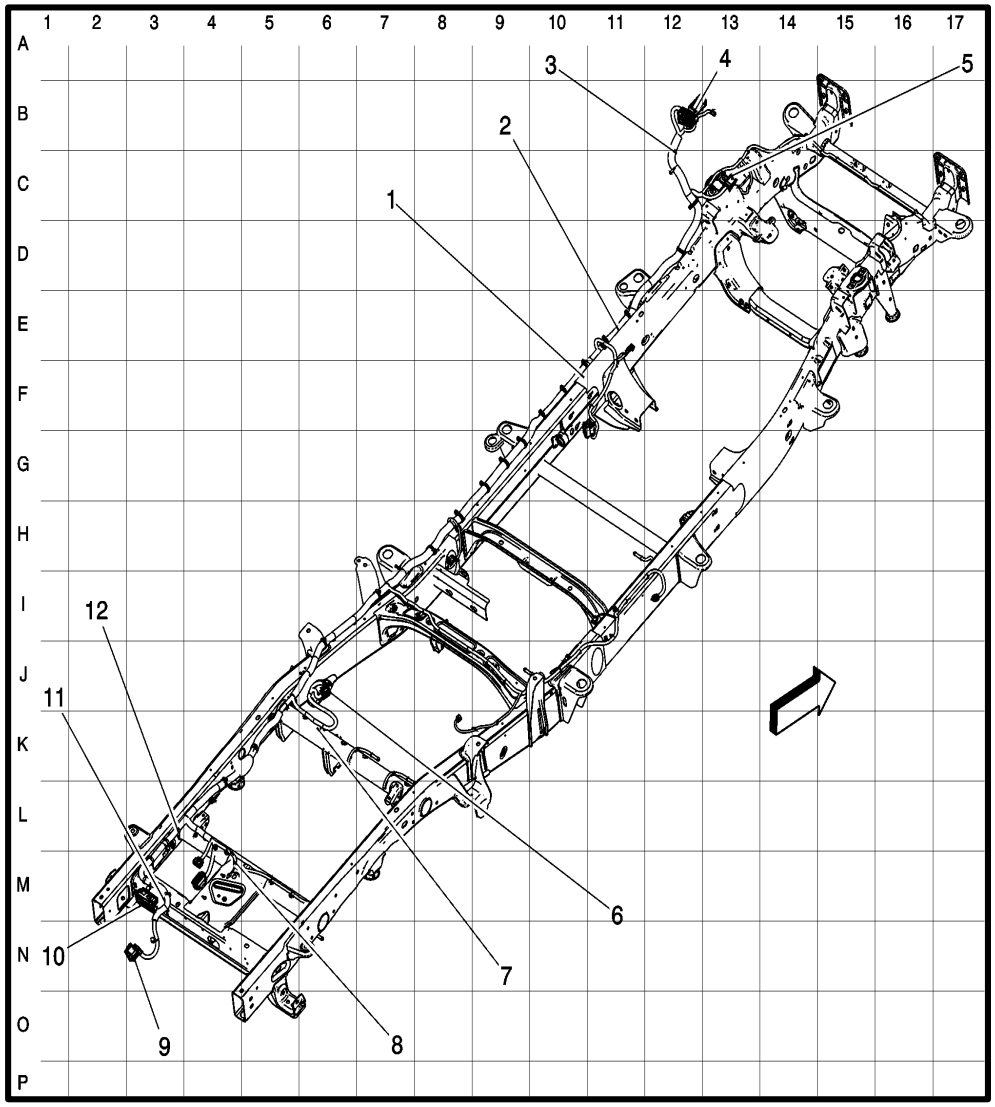
Back-up Alarm and Camera relay installation schematic



Back-up Alarm, Camera and Lamps schematic



Chassis Harness Routing



(1) SP29

(2) SP30

(3) SP31

(4) X185

(5) X125

(6) X350

(7) J375

(8) SP27

(9) X88 Trailer Connector

(10) X63A Junction Block – Rear Body

(11) SP111

(12) SP28

Charging System Description of Operation

Electrical Power Management Overview

The electrical power management system is designed to monitor and control the charging system and send diagnostic messages to alert the driver of possible problems with the battery and generator. This electrical power management system primarily utilizes existing on-board computer capability to maximize the effectiveness of the generator, to manage the load, improve battery state-of-charge and life, and minimize the system's impact on fuel economy. The electrical power management system performs 3 functions:

- It monitors the battery voltage and estimates the battery condition.
- It takes corrective actions by boosting idle speeds, and adjusting the regulated voltage.
- It performs diagnostics and driver notification.

The battery condition is estimated during ignition-off and during ignition-on. During ignition-off the state-of-charge of the battery is determined by measuring the open-circuit voltage. The state-of-charge is a function of the acid concentration and the internal resistance of the battery, and is estimated by reading the battery open circuit voltage when the battery has been at rest for several hours.

The state-of-charge can be used as a diagnostic tool to tell the customer or the dealer the condition of the battery. Throughout ignition-on, the algorithm continuously estimates state-of-charge based on adjusted net amp hours, battery capacity, initial state-of-charge, and temperature.

While running, the battery degree of discharge is primarily determined by a battery current sensor, which is integrated to obtain net amp hours.

In addition, the electrical power management function is designed to perform regulated voltage control to improve battery state-of-charge, battery life, and fuel economy. This is accomplished by using knowledge of the battery state-of-charge and temperature to set the charging voltage to an optimum battery voltage level for recharging without detriment to battery life.

Charging System

The Charging System Description and Operation is divided into 3 sections. The first section describes the charging system components and their integration into the electrical power management. The second section describes charging system operation. The third section describes the instrument panel cluster operation of the charge indicator, driver information center messages, and voltmeter operation.

Charging System Components

Generator

The generator is a serviceable component. If there is a diagnosed failure of the generator it must be replaced as an assembly. The engine drive belt drives the generator. When the rotor is spun it induces an alternating current (AC) into the stator windings. The AC voltage is then sent through a series of diodes for rectification. The rectified voltage has been converted into a direct current (DC) for use by the vehicles electrical system to maintain electrical loads and the battery charge. The voltage regulator integral to the generator controls the output of the generator. It is not serviceable. The voltage regulator controls the amount of current provided to the rotor. If the generator has field control circuit failure, the generator defaults to an output voltage of 13.8 V.

Body Control Module (BCM)

The body control module (BCM) is a GMLAN device. It communicates with the engine control module (ECM) and the instrument panel cluster for electrical power management (electrical power management) operation. The BCM determines the output of the generator and sends the information to the ECM for control of the generator turn on signal circuit. It monitors the generator field duty cycle signal circuit information sent from the ECM for control of the generator. It monitors a battery current sensor, the battery positive voltage circuit, and estimated battery temperature to determine battery state of charge. The BCM performs idle boost.

Battery Current Sensor

The battery current sensor is a serviceable component that is connected to either the negative or positive battery cable at the battery. The battery current sensor is a 3-wire Hall Effect current sensor. The battery current sensor monitors the battery current. It directly inputs to the BCM. It creates a 5-volt pulse width modulation (PWM) signal of 128 Hz with a duty cycle of 0–100 percent. Normal duty cycle is between 5–95 percent. Between 0–5 percent and 95–100 percent are for diagnostic purposes.

Engine Control Module (ECM)

When the engine is running, the generator turn-on signal is sent to the generator from the ECM, turning on the regulator. The generator's voltage regulator controls current to the rotor, thereby controlling the output voltage. The rotor current is proportional to the electrical pulse width supplied by the regulator. When the engine is started, the regulator senses generator rotation by detecting AC voltage at the stator through an internal wire. Once the engine is running, the regulator varies the field current by controlling the pulse width. This regulates the generator output voltage for proper battery charging and electrical system operation. The generator field duty terminal is connected internally to the voltage regulator and externally to the ECM. When the voltage regulator detects a charging system problem, it grounds this circuit to signal the ECM that a problem exists. The ECM monitors the generator field duty cycle signal circuit, and receives control decisions based on information from the BCM.

Instrument Panel Cluster

The instrument panel cluster provides the customer notification in case a concern with the charging system. There are 2 means of notification, a charge indicator and a driver information center message of SERVICE BATTERY CHARGING SYSTEM if equipped.

Charging System Operation

The purpose of the charging system is to maintain the battery charge and vehicle loads. There are 6 modes of operation and they include:

- Battery Sulfation Mode
- Charge Mode
- Fuel Economy Mode
- Headlamp Mode
- Start Up Mode
- Voltage Reduction Mode

The engine control module (ECM) controls the generator through the generator turn ON signal circuit. The ECM monitors the generator performance though the generator field duty cycle signal circuit. The signal is a pulse width modulation (PWM) signal of 128 Hz with a duty cycle of 0–100 percent. Normal duty cycle is between 5–95 percent. Between 0–5 percent and 95–100 percent are for diagnostic purposes. The following table shows the commanded duty cycle and output voltage of the generator (see table next page):

Commanded Duty Cycle	Generator Output Voltage
10%	11 V
20%	11.56 V
30%	12.12 V
40%	12.68 V
50%	13.25 V

Generator

The generator provides a feedback signal of the generator voltage output through the generator field duty cycle signal circuit to the ECM. This information is sent to the body control module (BCM). The signal is PWM signal of 128 Hz with a duty cycle of 0–100 percent. Normal duty cycle is between 5–99 percent. Between 0–5 percent and 100 percent are for diagnostic purposes.

Battery Sulfation Mode

The BCM will enter this mode when the interpreted generator output voltage is less than 13.2 V for 45 minutes. When this condition exists the BCM will enter Charge Mode for 2–3 minutes. The BCM will then determine which mode to enter depending on voltage requirements.

Charge Mode

The BCM will enter Charge Mode whenever one of the following conditions are met.

The wipers are ON for more than 3 seconds.

Climate Control Voltage Boost Mode Request via serial data is true, as sensed by the HVAC control head. High speed cooling fan, rear defogger and HVAC high speed blower operation can cause the BCM to enter the Charge Mode.

- The estimated battery temperature is less than 0°C (32°F).
- Battery State of Charge is less than 80 percent.
- Vehicle speed is greater than 145 km/h (90 mph)
- Current sensor fault exists.
- System voltage was determined to be below 12.56 V

When any one of these conditions is met, the system will set targeted generator output voltage to a charging voltage between 13.9–15.5 V, depending on the battery state of charge and estimated battery temperature.

Fuel Economy Mode

The BCM will enter Fuel Economy Mode when the estimated battery temperature is at least 0°C (32°F) but less than or equal to 80°C (176°F), the calculated battery current is less than 15 amperes and greater than −8 amperes, and the battery state-of-charge is greater than or equal to 80 percent. Its targeted generator output voltage is the open circuit voltage of the battery and can be between 12.5–13.1 V. The BCM will exit this mode and enter Charge Mode when any of the conditions described above are present.

Headlamp Mode

The BCM will enter Headlamp Mode whenever the headlamps are ON (high or low beams). Voltage will be regulated between 13.9–14.5 V.

Start Up Mode

When the engine is started the BCM sets a targeted generator output voltage of 14.5 V for 30 seconds.

Voltage Reduction Mode

The BCM will enter Voltage Reduction Mode when the calculated ambient air temperature is above 0°C (32°F). The calculated battery current is less than 1 ampere and greater than −7 amperes, and the generator field duty cycle is less than 99 percent. Its targeted generator output voltage is 12.9 V. The BCM will exit this mode once the criteria are met for Charge Mode.

Instrument Panel Cluster Operation

Charge Indicator Operation

The instrument panel cluster illuminates the charge indicator and displays a warning message in the driver information center if equipped, when the one or more of the following occurs:

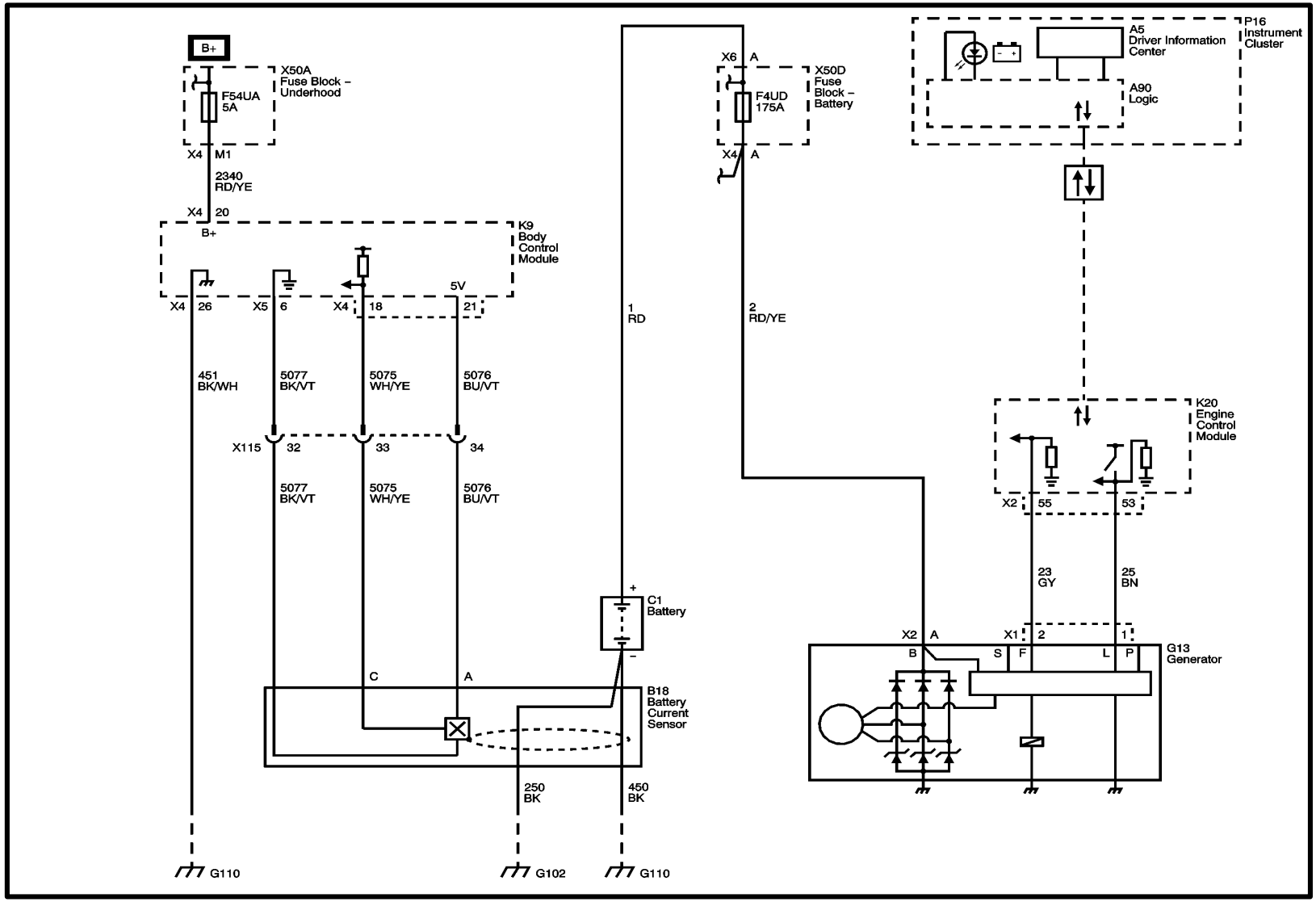
- The engine control module (ECM) detects that the generator output is less than 11 V or greater than 16 V. The instrument panel cluster receives a serial data message from the ECM requesting illumination.
- The instrument panel cluster determines that the system voltage is less than 11 V or greater than 16 V for more than 30 seconds. The instrument panel cluster receives a GMLAN message from the body control module (BCM) indicating there is a system voltage range concern.
- The instrument panel cluster performs the displays test at the start of each ignition cycle. The indicator illuminates for approximately 3 seconds.

Display Message:

BATTERY NOT CHARGING SERVICE CHARGING SYSTEM or SERVICE BATTERY CHARGING SYSTEM

The BCM and the ECM will send a serial data message to the driver information center for the BATTERY NOT CHARGING SERVICE CHARGING SYSTEM or SERVICE BATTERY CHARGING SYSTEM message to be displayed. It is commanded ON when a charging system DTC is a current DTC. The message is turned OFF when the conditions for clearing the DTC have been met.

Charging System schematic



Engine Idle Up

Elevated Idle

Is a standard option on all 6.6L Diesel Engines, which elevates the engine idle speed from base idle to 1050 RPMs when outside temperatures are below 32°F (0°C) and the engine coolant temperature is below 150°F (65°C). This feature enhances heater performance by raising the engine coolant temperature faster. It can be turned on or off, please refer to the ”Duramax Diesel Supplement” Owner’s Manual for more information.

High Idle

An option (RPO UF3) is available on certain HD models with cruise control. This system can be used to increase your engine idle speed for whatever reason an owner wishes: more generator output at idle, belt driven add on equipment, etc. The cruise control buttons located on the left hand side of the steering wheel are used to operate the High Idle option. For more information see the Owner’s Manual or online at ”www.gmupfitter.com”.

PTO (power take-off)

An option (RPO PTO) is available only on 3500 Chassis Cab models (31xxx series) equipped with the 6.6L Diesel Engine and Allison 6-speed transmission. The PTO allows the user to create an auxiliary power source for running add-on equipment, such as salt spreaders, pumps, winches, lift buckets, etc. The dash mounted PTO switch is used to turn on the PTO and controls engine speed to values higher than normal base idle. For more information see the ”Duramax Diesel Supplement” Owner’s Manual or online at ”www.gmupfitter.com”.

Vehicle Regular Production Option (RPO) Content

When attempting to determine a vehicle’s option refer to the vehicle’s SPID (Service Parts IDentfication) label.

Engine Idle Up (continued)

ADDING PTO OPTION TO A VEHICLE WITHOUT THE OPTION

Condition/Concern:

Some owners may request to add the PTO option to their vehicle when it is not equipped with the option. This option is available on 3500 Chassis Cab Models with the 6.6L Diesel engine only. The PTO option is now far more integrated with the vehicle than past models and utilizes the following components:

- The Body Control Module (BCM)
- The Engine Control Module (ECM)
- The Instrument Panel Cluster (IPC)
- The PTO gear
- The PTO mode select switch
- The Power Take Off Module (PTOM)
- The remote PTO enable switch
- The PTO relay
- The Transmission Control Module (TCM)

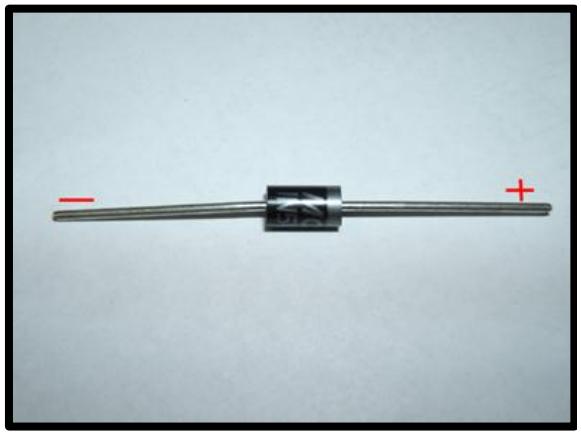
Recommendation/Instructions:

Due to the PTO's complex integration with the vehicle it is NOT recommended to add this option to any vehicle not already equipped with the OEM PTO option.

Installation of Electrical Aftermarket Accessories

Installation of a Diode to Suppress Voltage Spikes

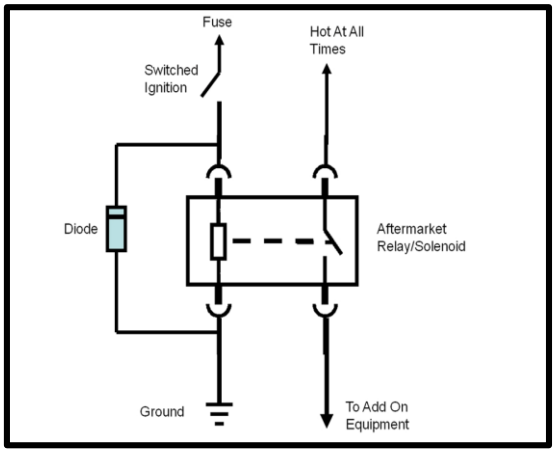
When an electromechanical solenoid or relay is de-energized rapidly by a mechanical switch or semiconductor, the collapsing magnetic field produces a substantial transient voltage in its effort to disperse the stored energy and oppose the sudden change in current flow. These voltage spikes can occur at the positive terminal when the solenoid or relay is de-energized (keyed-off). If a solenoid or relay is wired onto the Run/Crank circuit of the vehicle to control aftermarket equipment, the spikes can be transmitted onto the circuit. The spikes can permanently damage the internal circuitry of the sensitive electronic components and/or control modules that are on this bussed circuit. To prevent damage to these components, the solenoid or relay *MUST* have the control circuit suppressed with a diode.



Install a diode, P/N 12112422, across the coil of the solenoid. It is important that the striped end of the diode be connected to the positive terminal of the coil and the other end of the diode be connected to ground.

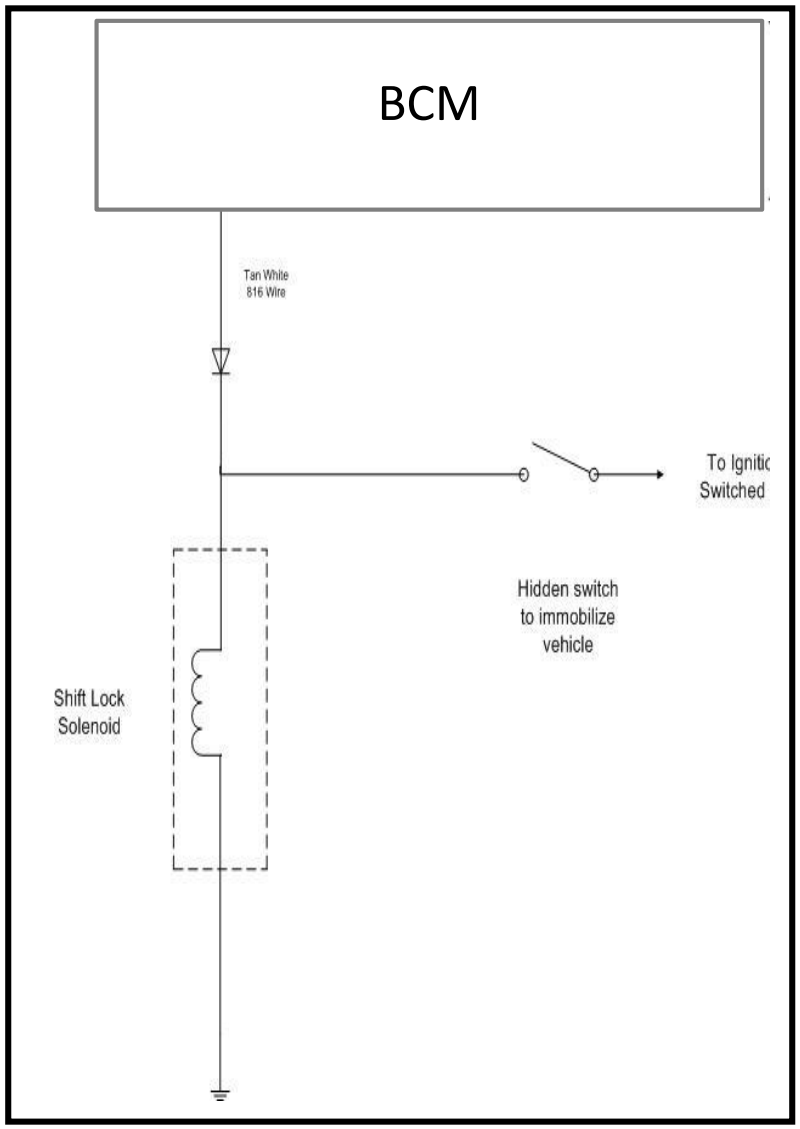
Important: Be sure to insulate the diode with heat shrink tubing before installing as shown in the picture above.

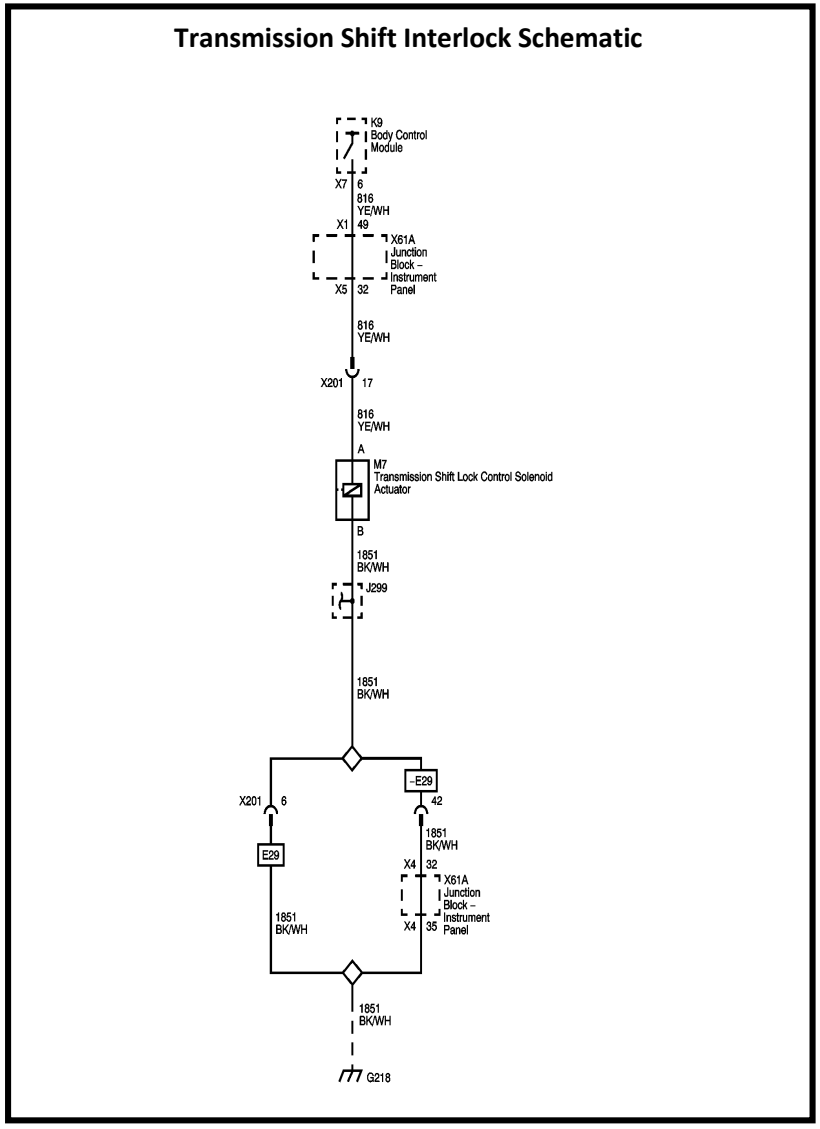
Notice: Some solenoids/relays may only have a positive post and will get their ground through the mounting bracket. In this case, the striped end of the diode is to be connected to the positive terminal and the other end should be connected to the ground of the solenoid/relay.



Install a diode, P/N 12112422, across the coil of the relay. It is important that the striped end of the diode be connected to the positive terminal of the coil and the other end of the diode be connected to ground. Be sure to insulate the diode with heat shrink tubing before installing.

Remote Vehicle Immobilizer





Exterior Lighting Systems Description and Operation

The exterior lighting system consists of the following lamps:

- Adaptive forward lighting
- Automatic headlamp leveling
- Backup lamps
- Daytime running lamps (DRL)
- Hazard warning lamps
- Headlamps
- Park, tail, license, and marker lamps
- Stop lamps
- Turn signal lamps

Low Beam Headlamps

Warning: The high intensity discharge system produces high voltage and current. To reduce the risk of severe shocks and burns:

- Never open the high intensity discharge system ballast or the arc tube assembly starter.
- Never probe between the high intensity discharge system ballast output connector and the arc tube assembly.

The headlamps consist of 2 high intensity discharge (HID) arc tubes and ballast on each side of the vehicle which provide high and low beams.

The headlamps may be turned ON in 3 different ways:

- When the headlamp switch is placed in the ON position, for normal operation
- When the headlamp switch is placed in the AUTO position, for automatic lamp control (ALC)
- When the headlamp switch is placed in the AUTO position, with the windshield wipers ON in daylight conditions, after a 6 second delay

Low Beam Headlamps (continued)

The body control module (BCM) monitors three signal circuits from the turn signal/multifunction switch. When the turn signal/multifunction switch is in the AUTO position, all three signal circuits are open. When placed in the AUTO position, the BCM monitors inputs from the ambient light sensor to determine if headlamps are required or if daytime running lamps will be activated based on outside lighting conditions. When the turn signal/multifunction switch is placed in the OFF position, the turn signal/multifunction switch headlamps OFF signal circuit is grounded, indicating to the BCM that the exterior lamps should be turned OFF. With the turn signal/multifunction switch in the PARK position, the turn signal/multifunction switch park lamps ON signal circuit is grounded, indicating that the park lamps have been requested. When the turn signal/multifunction switch is placed in the HEADLAMP position, both the turn signal/multifunction switch park lamps ON signal circuit and the turn signal/multifunction switch headlamps ON signal circuit are grounded. The BCM responds to the low beam request by applying ground to the low beam relay control circuit which energizes the low beam relay. With the low beam relay energized, the switch contacts close allowing battery voltage to flow through the low beam fuses. Battery voltage is then applied from the fuses, through the low beam control circuits to the left and right headlamp ballast located in each headlamp assembly. When battery voltage is applied to the headlamp ballast through the low beam control circuits, the ballast charge the starter to start the lamp. High intensity discharge (HID) headlamps do not have filaments like traditional bulbs, instead the starter uses a high voltage transformer to convert the input voltage into a higher voltage. This increased voltage is used in order to create an arc between the electrodes in the bulb.

The BCM will also command the low beam headlamps ON during daylight conditions when the following conditions are met:

- Headlamp switch in the AUTO position
- Windshield wipers ON
- Vehicle in any gear but PARK

When the BCM commands the low beam headlamps ON, the operator will notice the interior backlighting for the instrument cluster and the various other switches dim to the level of brightness selected by the instrument panel dimmer switch.

Run Up Of the Lamp

Each ballast requires higher amperage in order to ensure normal startup and run up of the lamp. Run up is the term used to describe the extra power level given to the bulb. The input current during the steady state operation is lower that the start up amperage. After the lamp receives the strike from the starter and the arc is established, the ballast uses its operating voltage in order to provide the run up power needed in order to keep the lamp on. The lamp rapidly increases in intensity from a dim glow to a very high-intensity, bright light called a steady state. Within a few seconds of the arc being established in the bulb, the majority of steady state is complete. 100 percent of the steady state is completed shortly thereafter. A high watt power level is necessary in order to bring the lamp to a steady state in such a short period of time. The high watt power level allows the lamp to meet the SAE light vs. time specification.

When to Change the HID Bulb

Bulb failure, end of life occurs when the bulb gets old and becomes unstable. The bulb may begin shutting itself off sporadically and unpredictably at first, perhaps only once during a 24-hour period. When the bulb begins shutting itself off occasionally, the ballast will automatically turn the bulb back on again within 0.5 seconds. The ballast will re-strike the bulb so quickly that the bulb may not appear to have shut off. As the bulb ages, the bulb may begin to shut off more frequently, eventually over 30 times per minute. When the bulb begins to shut off more frequently, the ballast receives excessive, repetitive current input. Repetitive and excessive restarts or re-strikes, without time for the ballast to cool down, will permanently damage the ballast. As a safeguard, when repetitive re-strikes are detected, the ballast will not attempt to re-strike the lamp. The ballast then shuts down and the bulb goes out.

The following symptoms are noticeable signs of bulb failure:

- Flickering light, caused in the early stages of bulb failure
- Lights go out, caused when the ballast detects excessive, repetitive bulb re-strike
- Color change—the lamp may change to a dim pink glow.

Input power to the ballast must be terminated in order to reset the ballast's fault circuitry. In order to terminate the input power to the ballast, turn the lights off and back on again. Turning the lights off and back on again resets all of the fault circuitry within the ballast until the next occurrence of excessive, repetitive bulb re-strikes. When excessive, repetitive bulb re-strikes occur, replace the starter/arc tube assembly. The ballast will begin the start-up process when the starter/arc tube assembly is replaced. Repeatedly resetting the input power can overheat the internal components and cause permanent damage to the ballast. Allow a few minutes of cool-down time in between reset attempts.

Light Color

White light has a different color rating than regular headlamps. The range of white light that is acceptable is broad when compared to halogens. Therefore, some variation in headlight coloring between the right and left headlamp will be normal. One high intensity discharge (HID) at the end of the normal range may appear considerably different in color from one at the other end of the range. Difference in color is normal. Replace the arc tube only if the arc tube is determined to be at the bulb failure stage.

High Beam Headlamps

When the low beam headlamps are ON and the turn signal/multifunction switch is placed in the high beam position, ground is applied to the BCM through the high beam signal circuit. The BCM responds to the high beam request by applying ground to the high beam relay control circuit which energizes the high beam relay. With the high beam relay energized, the switch contacts close allowing battery voltage to flow through the left and right high beam fuses to the high beam control circuits and on to the left and right high beam solenoid actuators within the headlamp assemblies. Once the high beam solenoid actuators are active, the solenoid shutters open in each headlamp assembly exposing the remaining portion of the headlamp that was covered by the shutters illuminating the high beams at full intensity.

Adaptive Forward Lighting (AFL)

The AFL consists of the following components:

- Headlamp control module
- Headlamp actuator - left
- Headlamp actuator - right

Battery positive voltage is applied to the headlamp control module at all times and when the ignition switch is in the RUN and CRANK positions. The headlamp control module has an operational voltage range of about 10.5-16 volts and is only fully functional when the ignition switch is in the RUN position. The voltage input from the ignition switch wakes the headlamp control module microprocessor. The headlamp control module receives serial data messages from the engine control module (ECM), transmission control module (TCM), electronic brake control module (EBCM), and body control module (BCM) with regards to power mode, speed, steering angle, transmission gear selection, and headlamp switch status. The headlamp control module calculates the headlamp angle and sends commands to the left and right headlamp actuators. The headlamp actuators drive the headlamps to the position commanded by the headlamp control module. The headlamp control module monitors the headlamp actuator motor control circuits for proper circuit continuity and for shorts to ground or voltage.

Adaptive Forward Lighting (AFL) (continued)

If a malfunction is detected, a DTC will be stored in memory and the driver will be notified with a message displayed over the driver information center (DIC) located on the instrument panel cluster (IPC).

The headlamp control module controls the left headlamp movement by 15 degrees to the left and 5 degrees to the right, and the right headlamp movement by 5 degrees to the left and 15 degrees to the right. The direction the headlamps move is controlled by the steering wheel angle and is limited by steering angles of approximately +/- 90 degrees. The AFL will not operate with the transmission in reverse or at vehicle speeds less than 2 mph. Movement of the headlamps is restricted at low vehicle speeds and full movement of the lamps is not allowed until vehicle speed is greater than approximately 30 mph. The following conditions must be met before the AFL will operate:

- Headlamp switch in the AUTO position and high or low beam headlamps must be active
- Steering angle position must be received from the EBCM with the steering signal validity bit set
- Vehicle speed must be received from the ECM with the steering signal validity bit set
- Transmission gear position must be received from the TCM with the transmission gear position validity bit set

Automatic Headlamp Leveling

The Automatic Headlamp Leveling Systems consist of the following components:

- Headlamp control module
- Headlamp leveling actuator - left
- Headlamp leveling actuator - right
- Suspension position sensor - front
- Suspension position sensor - rear

The automatic headlamp leveling system automatically maintains the vertical alignment of the headlamps when the vehicle load and driving conditions change. Each headlamp assembly contains a headlamp leveling motor that is controlled by the headlamp control module. The front and rear suspension position sensors provide the headlamp control module with suspension position information. Each sensor receives a 5-volt reference, signal, and low reference circuits from the headlamp control module. The sensors are connected to the control arms of the front and rear suspension. As the vehicle travels, the suspension compresses and rebounds moving the suspension position sensor arms. This causes the signal output of the sensor to change. The headlamp control module compares the information from both suspension position sensors and adjusts the headlamp leveling as needed.

Daytime Running Lamps (DRL)

The daytime running lamps (DRL) will illuminate continuously when the following conditions are met:

- The ignition is in the RUN or CRANK position
- The shift lever is out of the PARK position for vehicles equipped with automatic transmissions or the parking brake is released for vehicles with manual transmissions
- The low and high beam headlamps are OFF

The ambient light sensor is used to monitor outside lighting conditions. The ambient light sensor provides a voltage signal that will vary between 0.2 and 4.9 volts depending on outside lighting conditions. The body control module (BCM) provides a 5-volt reference signal to the ambient light sensor and the HVAC control module provides a low reference ground. The BCM monitors the ambient light sensor signal circuit to determine if outside lighting conditions are correct for either daytime running lights (DRL) or automatic lamp control (ALC) when the headlamp switch is in the AUTO position. In daylight conditions the BCM will command the designated DRLs ON. During low light conditions the BCM will command the low beam headlamps ON. Any function or condition that turns on the headlamps will cancel DRL operation.

Automatic Lamp Control

Place the turn signal/multifunction switch in the AUTO position for automatic lamp control. During automatic lamp control the headlamps will be off during daylight conditions but will turn on when the ambient light sensor detects low outside light level. The ambient light sensor is a light sensitive transistor that varies the voltage signal to the HVAC control module. The HVAC control module sends a signal to the body control module (BCM) via serial data commanding the BCM to apply ground to the headlamp low beam relay control circuit. This energizes the low beam relay, closing the switched side and applies battery voltage to the LEFT and RIGHT LOW BEAM fuses. Battery voltage is applied from the low beam fuses, through the low beam voltage supply circuits to low headlamp assemblies.

Flash to Pass (FTP)

When the turn signal/multifunction switch is momentarily placed in the flash to pass (FTP) position, ground is applied to the turn signal/multifunction switch. The turn signal/multifunction switch applies ground to the body control module (BCM) through the FTP switch signal circuit. The BCM responds to the FTP request by applying ground to the high beam relay control circuit. This energizes the high beam relay, closing the switch side contacts of the high beam relay, applying battery voltage to the left and right high beam fuses. Battery voltage is applied from the high beam fuses through the high beam control circuit to the high beam headlamp assemblies. This causes the high beam headlamps to illuminate at full brightness momentarily.

Hazard Lamps

The hazard flashers may be activated in any power mode. The hazard switch signal circuit is momentarily grounded when the hazard switch is pressed. The body control module (BCM) responds to the hazard switch signal input by supplying battery voltage to all four turn signal lamps in an ON and OFF duty cycle. When the hazard switch is activated, the BCM sends a serial data message to the instrument panel cluster (IPC) requesting both turn signal indicators to be cycled ON and OFF.

The I/P dimmer switch controls the brightness of the interior backlighting components. When the I/P dimmer switch is placed in a desired brightness position, the body control module (BCM) receives a signal from the I/P dimmer switch and responds by applying a pulse width modulated (PWM) voltage to the hazard switch light emitting diode (LED) backlighting control circuit illuminating the LED to the desired level of brightness.

Park, Tail, and License Lamps

When the headlamp switch is placed in the HEAD or PARK position, ground is applied to the park lamp switch ON signal circuit to the body control module (BCM). The BCM responds by applying voltage to the park lamps, tail lamps, and license lamps control circuits illuminating the park, tail, and license lamps.

Stop Lamps

The brake pedal position (BPP) sensor is used to sense the action of the driver application of the brake pedal. The BPP sensor provides an analog voltage signal that will increase as the brake pedal is applied. The body control module (BCM) provides a low reference signal and a 5-volt reference voltage to the BPP sensor. When the variable signal reaches a voltage threshold indicating the brakes have been applied, the BCM will apply battery voltage to the left and right stop lamp control circuits as well as the center high mounted stop lamp (CHMSL) control circuit illuminating the left and right stop lamps and the CHMSL.

Turn Signal Lamps

Ground is applied at all times to the turn signal/multifunction switch. The turn signal lamps may only be activated with the ignition switch in the ON or START positions. When the turn signal/multifunction switch is placed in either the TURN RIGHT or TURN LEFT position, ground is applied to the body control module (BCM) through either the right turn or left turn signal switch signal circuit. The BCM responds to the turn signal switch input by applying a pulsating voltage to the front and rear turn signal lamps through their respective control circuits. When a turn signal request is received by the BCM, a serial data message is sent to the instrument panel cluster (IPC) requesting the respective turn signal indicator be pulsed ON and OFF.

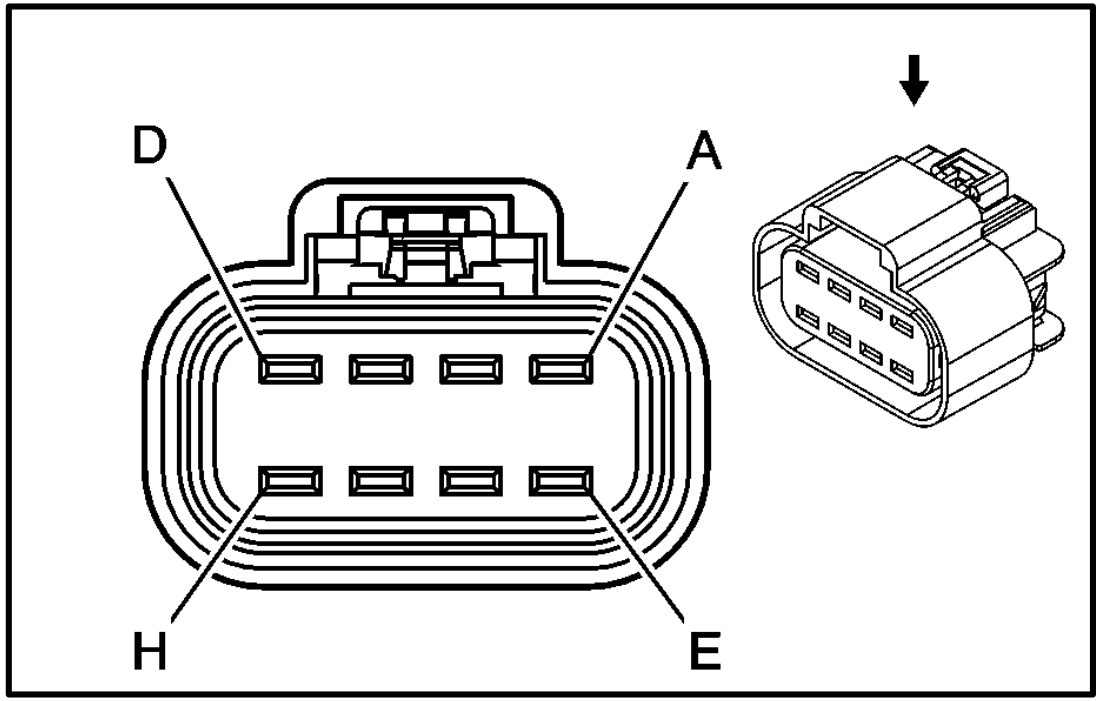
Backup Lamps

With the engine ON and the transmission in the REVERSE position, the transmission control module (TCM) sends a serial data message to the body control module (BCM). The message indicates that the gear selector is in the REVERSE position. The BCM applies battery voltage to the backup lamps control circuit illuminating the backup lamps. Once the driver moves the gear selector out of the REVERSE position, a message is sent by the TCM via serial data requesting the BCM to remove battery voltage from the backup lamps control circuit. The engine must be ON for the backup lamps to operate.

Battery Run Down Protection/Inadvertent Power

To provide battery run down protection, the exterior lamps will be deactivated automatically under certain conditions. The BCM monitors the state of the headlamp switch. If the park or headlamp switch is ON when the ignition switch is placed in either the CRANK or RUN position and then placed in the OFF position, the BCM initiates a 10 min timer. At the end of the 10 min, the BCM will turn off the control power output to the park lamp controls as well as the headlamp relay coils, deactivating the exterior lamps. This feature will be cancelled if any power mode other than OFF becomes active. The BCM will disable battery run down protection if any of the following conditions exist. The park or headlamp switch is placed in the ON to OFF position, and back to the ON position during battery run down protection. The BCM determined that the park or headlamp switch was not active when the ignition was turned OFF.

X110 Left Forward Lamp Harness to Headlamp - Connector End View and Pin-out

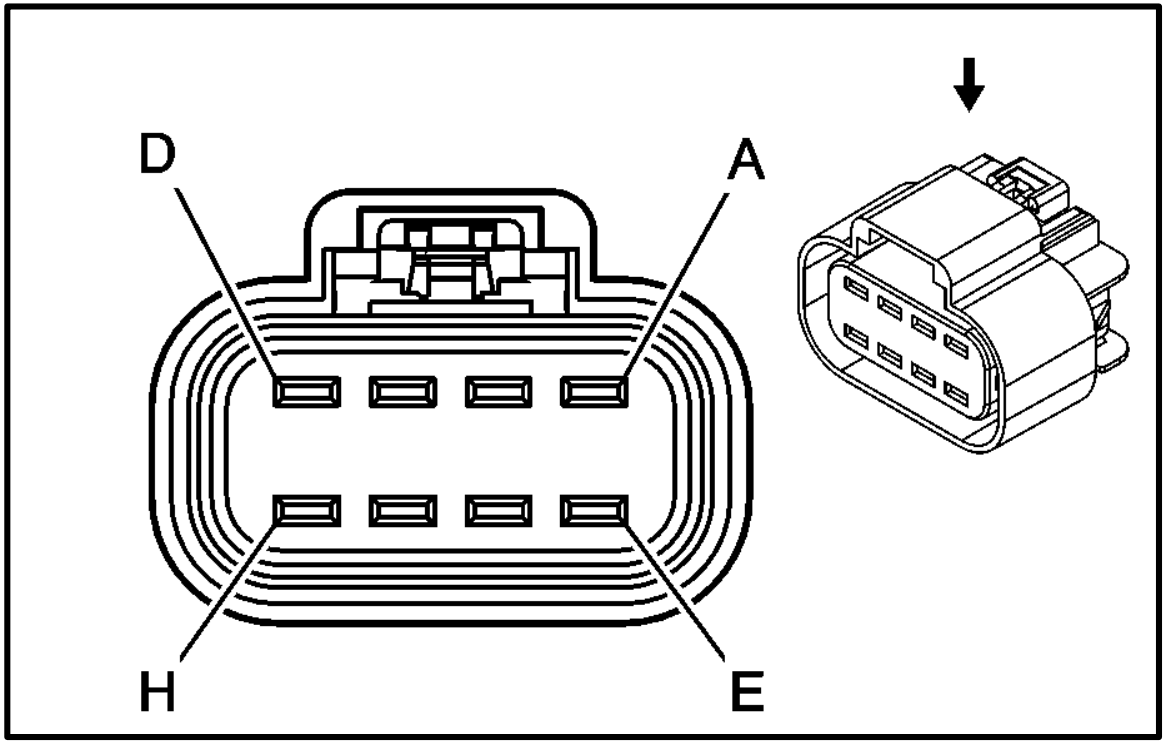


Connector Part Information	Connector Part Information
• Harness Type: Forward Lamp • OEM Connector: 15326654 • Service Connector: SEE NOTE • Description: 8-Way F 280 GT 5.8 Series, Sealed (BK)	• Harness Type: Left Headlamp • OEM Connector: Not Available • Service Connector: Service by Harness - See Part Catalog • Description:

Terminal Part Information							
Terminal Type ID	**Terminated Lead**	**Diagnostic Test Probe**	**Terminal Removal Tool**	**Service Terminal**	**Tray**	**Core Crimp**	**Insulation Crimp**
I	13578906	J-35616-4A (PU)	J-38125-553	15304720	19	4	5
II	13578915	J-35616-4A (PU)	J-38125-553	15304719	19	2	5
III	13578915	J-35616-4A (PU)	J-38125-553	15304719	19	E	5
IV	Pending	Pending	Pending	Not Available	Not Available	Not Available	Not Available

X110 Forward Lamp Harness to Headlamp - Left Harness												
Pin	**Size**	**Color**	**Circuit**	**Terminal Type ID**	**Option**	**Function**	**Pin**	**Size**	**Color**	**Circuit**	**Terminal Type ID**	**Option**
A	1.5	BK	150	I	-	Ground	A	1.5	BK	150	IV	-
B	0.75	YE	712	II	-	Left Headlamp Low Beam Supply Voltage	B	0.75 0.75	YE YE	712 712	IV	Z88 X88
C	0.5	WH	711	III	-	Left Headlamp High Beam Supply Voltage	C	0.5 0.5	WH WH	711 711	IV	Z88 X88
D	-	-	-	-	-	Not Occupied	D	-	-	-	-	-
E	0.5	VT/GY	709	III	-	Left Park Lamp Supply Voltage	E	0.5 0.5	VT/GY VT/GY	709 709	IV	X88 Z88
F	0.75	D-BU/WH	1314	II	-	Left Front Turn Signal Lamp Supply Voltage	F	0.75 0.75	BU/WH BU/WH	1314 1314	IV	X88 Z88
G	0.75	GY/D-BU	7538	II	-	Left Front DRL Supply Voltage	G	0.75	GY/BU	7538	IV	Z88/Y91/GAT/SLT
H	0.5	VT/GY	709	III	-	Left Park Lamp Supply Voltage	H	0.5	VT/GY	709	IV	Z88/Y91/GAT/SLT

X120 Right Forward Lamp Harness to Headlamp – Connector End View and Pin-out

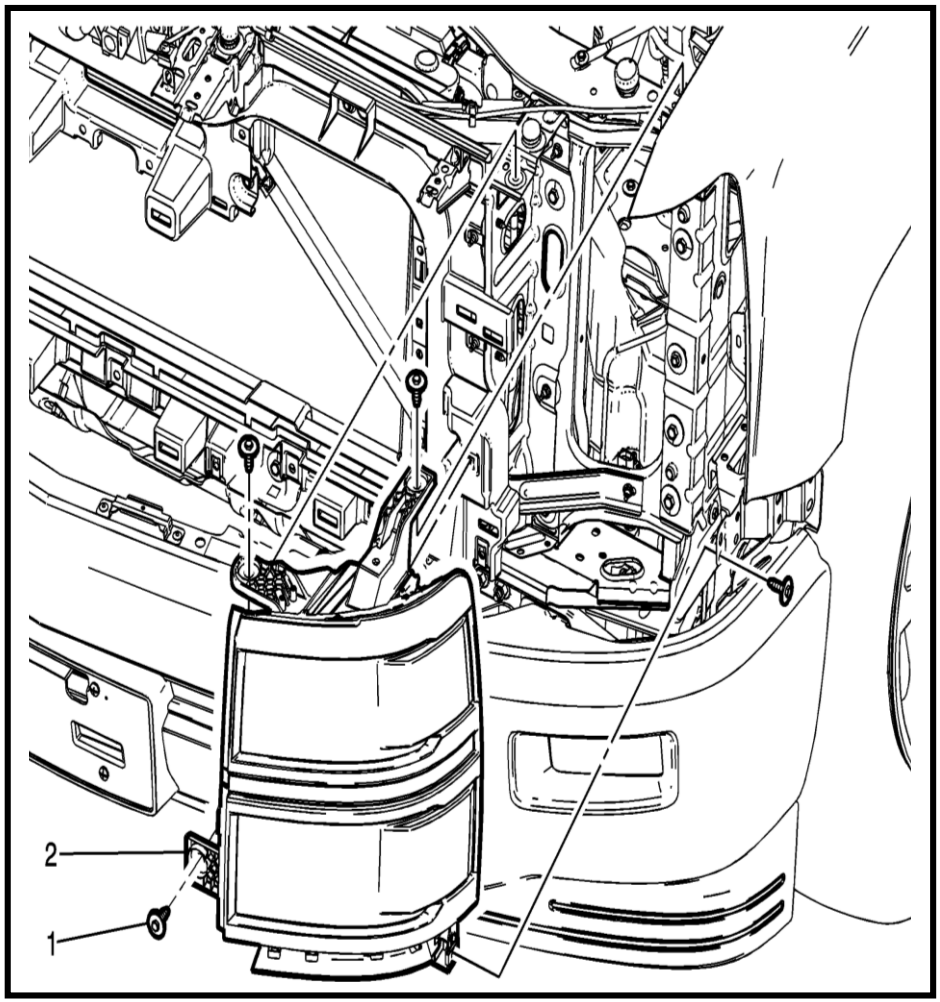


Connector Part Information	Connector Part Information
• Harness Type: Right Headlamp • OEM Connector: Not Available • Service Connector: Service by Harness - See Part Catalog • Description:	• Harness Type: Forward Lamp • OEM Connector: 15326654 • Service Connector: SEE NOTE • Description: 8-Way F 280 GT 5.8 Series, Sealed (BK)

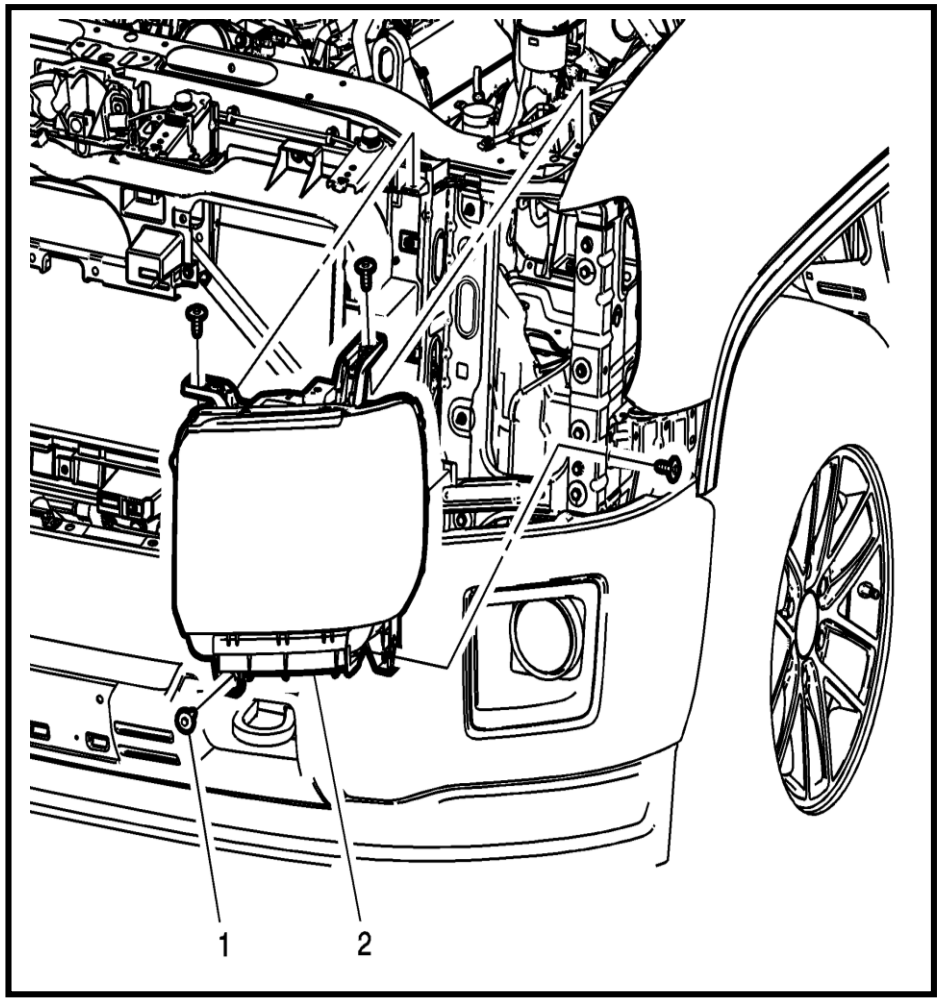
Terminal Part Information							
Terminal Type ID	**Terminated Lead**	**Diagnostic Test Probe**	**Terminal Removal Tool**	**Service Terminal**	**Tray**	**Core Crimp**	**Insulation Crimp**
I	Pending	Pending	Pending	Not Available	Not Available	Not Available	Not Available
II	13578906	J-35616-4A (PU)	J-38125-553	15304720	19	4	5
III	13578915	J-35616-4A (PU)	J-38125-553	15304719	19	2	5
IV	13578915	J-35616-4A (PU)	J-38125-553	15304719	19	E	5

X120 Forward Lamp Harness to Headlamp - Right Harness												
Pin	**Size**	**Color**	**Circuit**	**Terminal Type ID**	**Option**	**Function**	**Pin**	**Size**	**Color**	**Circuit**	**Terminal Type ID**	**Option**
A	1.5	BK	250	I	-	Ground	A	1.5	BK	250	II	-
B	0.75 0.75	YE YE	312 312	I	X88 Z88	Right Headlamp Low Beam Supply Voltage Right Headlamp Low Beam Supply Voltage	B	0.75	YE	312	III	-
C	0.5 0.5	WH WH	311 311	I	X88 Z88	Right Headlamp High Beam Supply Voltage Right Headlamp High Beam Supply Voltage	C	0.5	WH	311	IV	-
D	-	-	-	-	-	Not Occupied	D	-	-	-	-	-
E	0.5 0.5	GY/BN GY/BN	309 309	I	Z88 X88	Right Park Lamp Supply Voltage Right Park Lamp Supply Voltage	E	0.5	GY/BN	309	IV	-
F	0.75 0.75	GN/VT GN/VT	1315 1315	I	X88 Z88	Right Front Turn Signal Lamp Supply Voltage Right Front Turn Signal Lamp Supply Voltage	F	0.75	L-GN/VT	1315	III	-
G	0.75	BU/BN	7539	I	Z88/Y91/GAT/SLT	Right Front DRL Supply Voltage	G	0.75	D-BU/BN	7539	III	-
H	0.5	GY/BN	309	I	Z88/Y91/GAT/SLT	Right Park Lamp Supply Voltage	H	0.5	GY/BN	309	IV	-

Headlamp Replacement

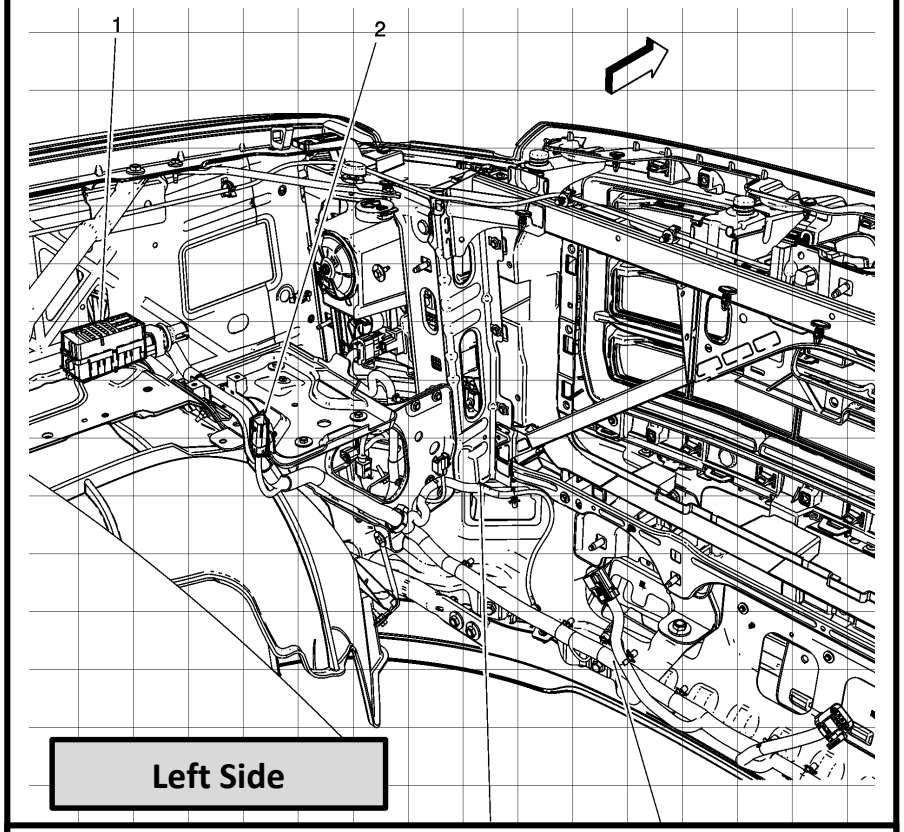


Chevrolet



GMC

Under hood Harness Routing

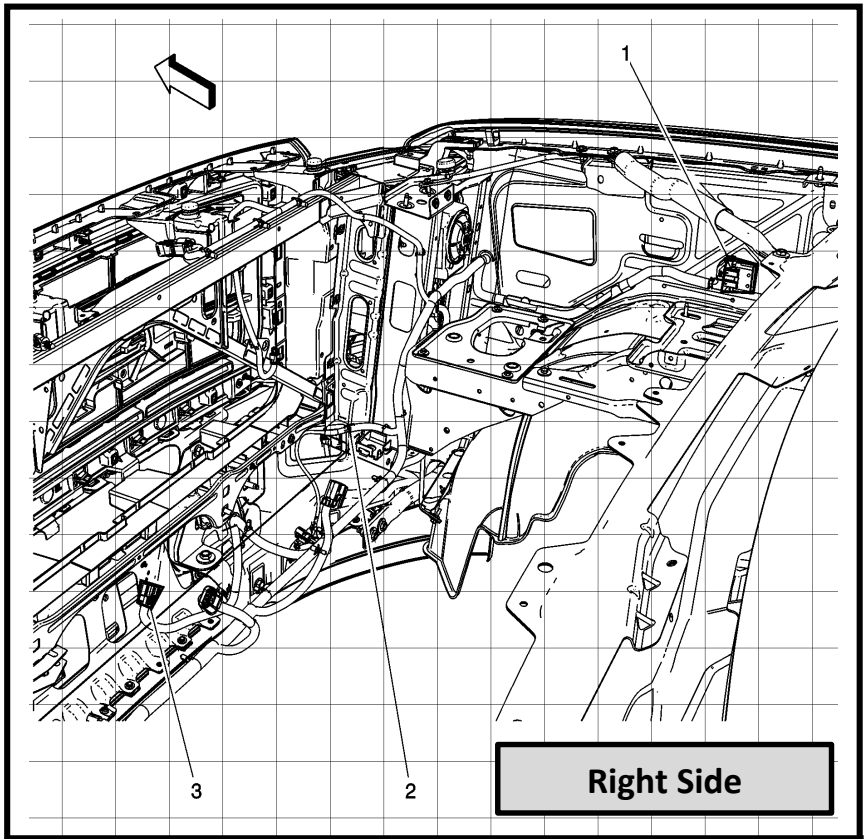


1) X50A Fuse Block – Underhood

(2) X105

(3) J130

(4) J115

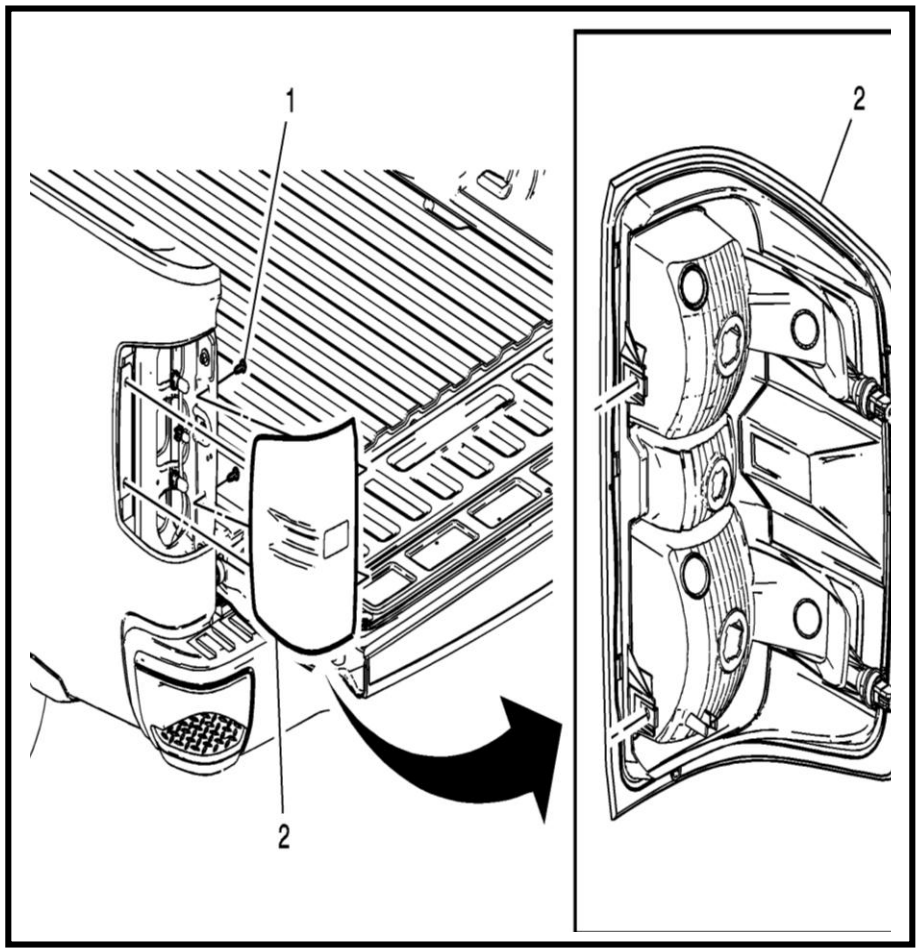


(1) X150

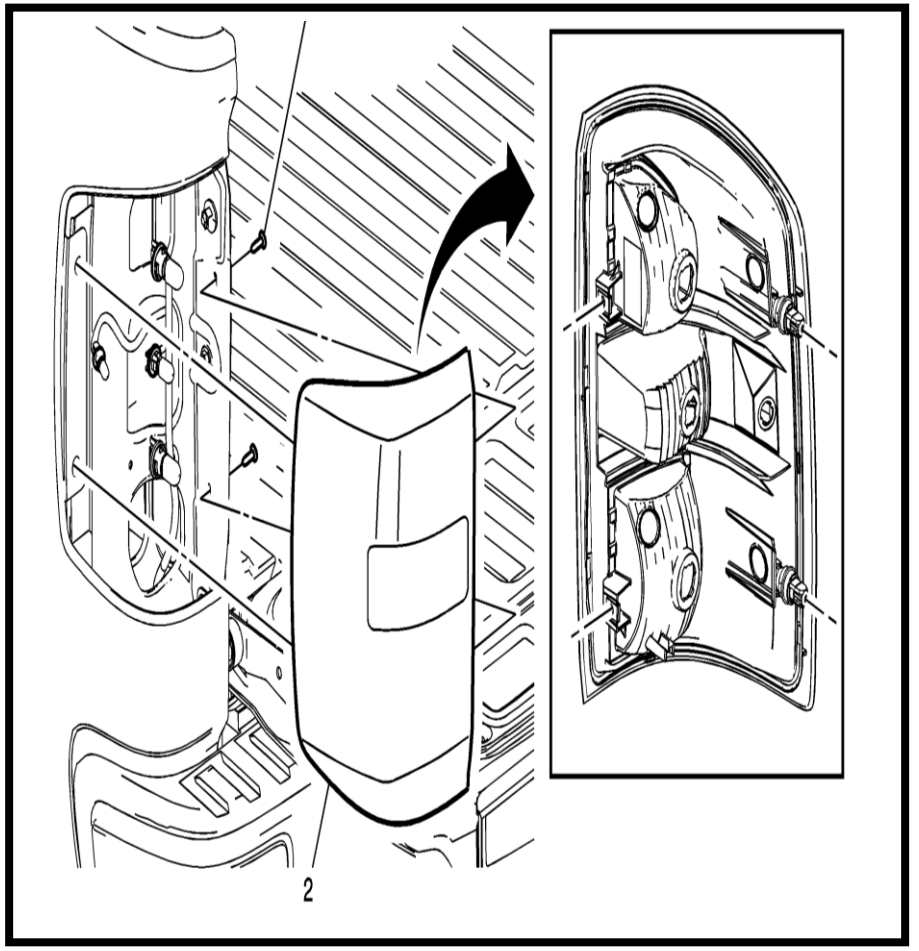
(2) J125

(3) X100

Tail lamp Replacement

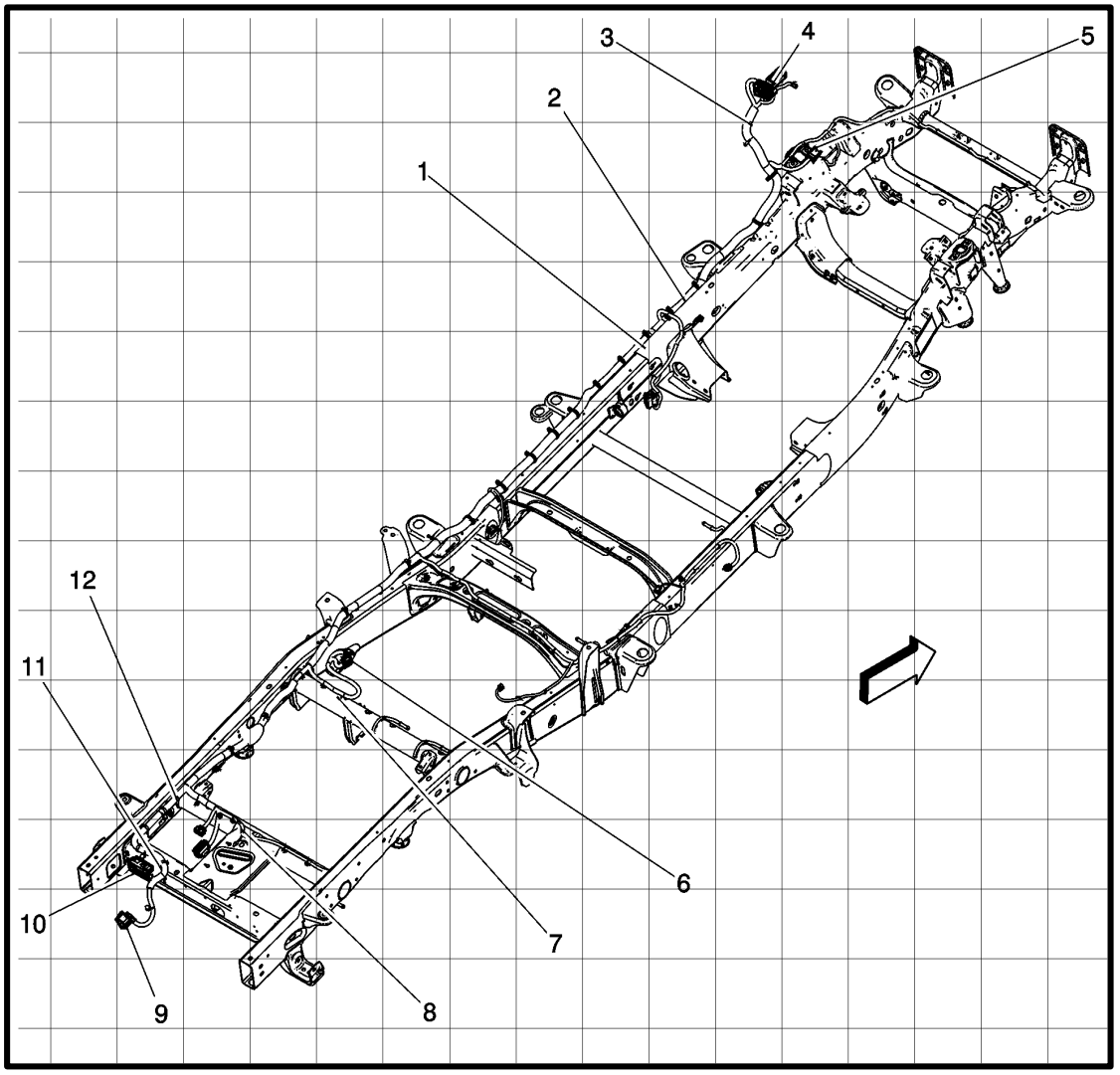


Chevrolet



GMC

Chassis Harness Routing



(1) SP29

(2) SP30

(3) SP31

(4) X185

(5) X125

(6) X350

(7) J375

(8) SP27

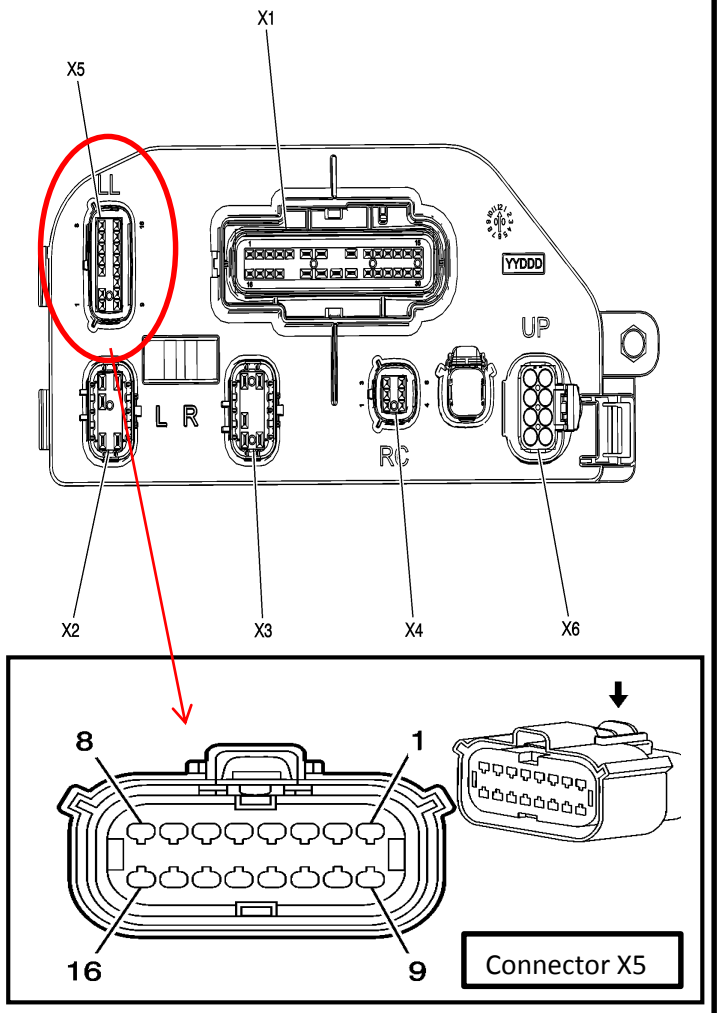
(9) X88 Trailer Connector

(10) X63A Junction Block – Rear Body

(11) SP111

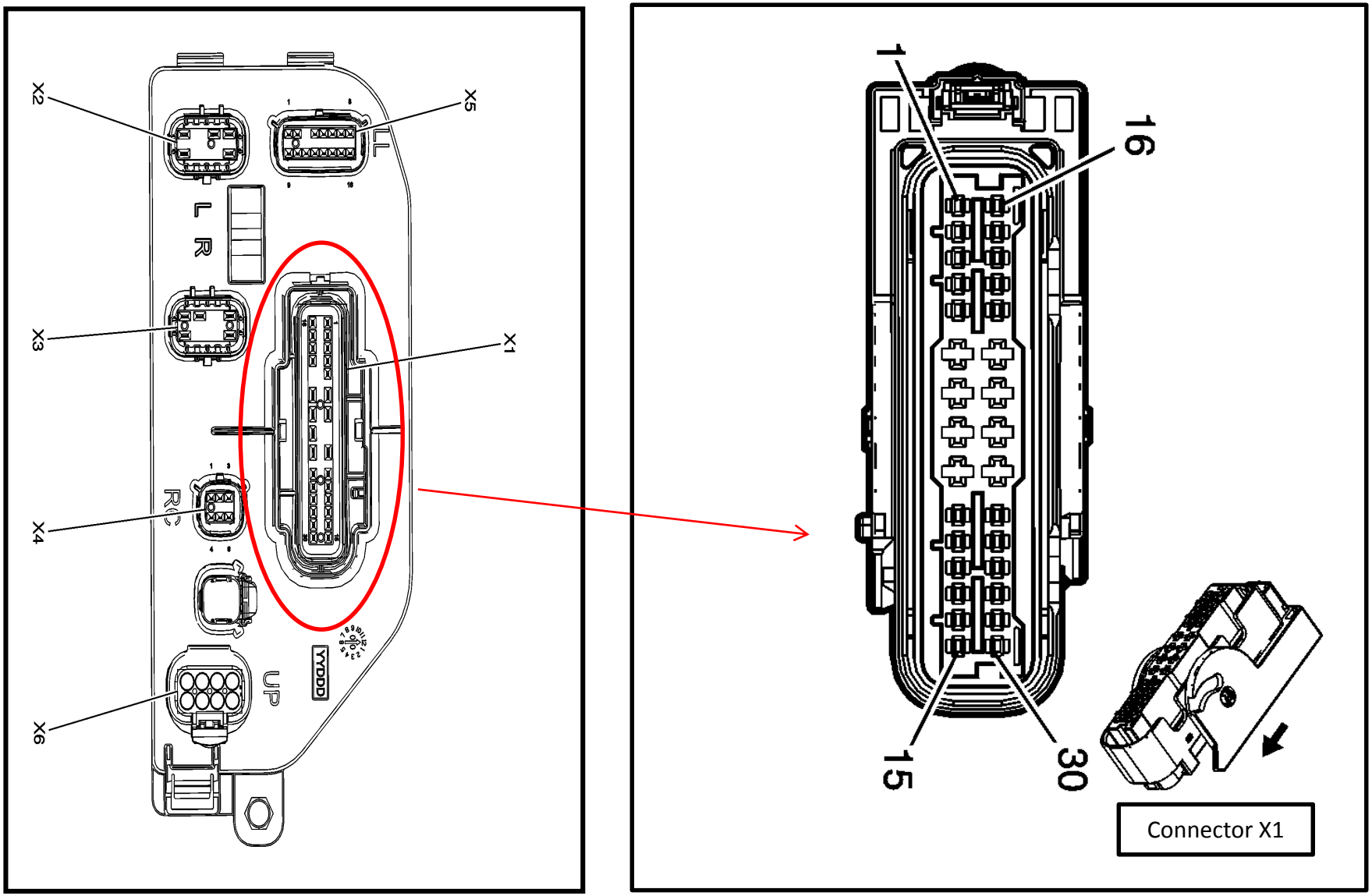
(12) SP28

Rear Body Junction Block X63A –Connector X5



Pin	Size	Color	Circuit	Function
1	0.5	BK/GY	2379	Object Sensor Low Reference
2	0.5	VT/GY	709	Left Park Lamp Supply Voltage
4	-	-	-	Not Occupied
5	0.5	BK	1750	Ground
6	0.5	BK	1750	Ground
7	0.5	BK	1750	Ground
8	0.5	BK	1750	Ground
9	0.5	L-GN/YE	6846	Rear License Lamp Supply Voltage
10	0.5	L-GN/YE	6846	Rear License Lamp Supply Voltage
11	0.5	GY/BN	309	Right Park Lamp Supply Voltage
12	0.5	YE/VT	2378	Right Rear Corner Object Sensor Signal
13	0.5	YE/WH	2377	Right Rear Middle Object Sensor Signal
14	0.5	YE/D-BU	2376	Left Rear Middle Object Sensor Signal
15	0.5	YE	2375	Left Rear Corner Object Sensor Signal
16	0.5	BN/WH	2374	Object Sensor Supply Voltage

Rear Body Junction Block X63A –Connector X1



X63A Junction Block - Rear Body X1 Pin-outs

X63A Junction Block - Rear Body X1				
Pin	**Size**	**Color**	**Circuit**	**Function**
1.	0.5	YE/VT	2378	Right Rear Corner Object Sensor Signal
2.	0.5	YE/WH	2377	Right Rear Middle Object Sensor Signal
3.	0.5	YE/D-BU	2376	Left Rear Middle Object Sensor Signal
4.	0.5	YE	2375	Left Rear Corner Object Sensor Signal
5.	0.5	BN/WH	2374	Object Sensor Supply Voltage
6.	1.5	BK	1750	Ground
7.	1.5	BK	2150	Ground
8.	-	-	-	Not Occupied
9.	0.8	L-GN/WH	24	Backup Lamp Supply Voltage
10.	0.8	WH/VT	1430	Exterior Courtesy Lamp Supply Voltage
11.	-	-	-	Not Occupied
12.	-	-	-	Not Occupied
13.	0.5	VT/GY	1054	Stop Lamp Supply Voltage
14.	-	-	-	Not Occupied

15.	**-**	**-**	**-**	**Not Occupied**
16.	**0.5**	**L-GN/YE**	**6846**	**Rear License Lamp Supply Voltage**
17.	**0.5**	**BK/GY**	**2379**	**Object Sensor Low Reference**
18.	**0.8**	**YE/D-BU**	**18**	**Left Rear Stop/Turn Lamp Supply Voltage**
19.	**0.8**	**BN/L-GN**	**19**	**Right Rear Stop/Turn Lamp Supply Voltage**
20.	**-**	**-**	**-**	**Not Occupied**
21.	**0.8**	**GY/BN**	**309**	**Right Park Lamp Supply Voltage**
22.	**0.8**	**VT/GY**	**709**	**Left Park Lamp Supply Voltage**
23.	**-**	**-**	**-**	**Not Occupied**
24.	**1**	**BK**	**1750**	**Ground**
25.	**0.5**	**L-GN/WH**	**24**	**Backup Lamp Supply Voltage**
26.	**0.5**	**VT/L-GN**	**1739**	**Run/Crank Ignition 1 Voltage**
27.	**0.5**	**GY/YE**	**6972**	**Camera Signal #2 +**
28.	**0.5**	**WH/D-BU**	**6973**	**Camera Signal #2**
29.	**0.5**	**BK**	**2550**	**Ground**
30.	**0.5**	**BK**	**6974**	**Camera Drain Wire**

Bulb Replacement

Exterior Lamp	Bulb Number	
	Chevrolet	GMC
Back-up Lamp	921 (W16W)	921 (W16W)
Back-up Lamp*	1156	1156
Cargo Lamp	921 (W16W)	921 (W16W)
Center High-Mounted Stop lamp (CHMSL)	921LL	921LL
Fog Lamp	PS24W	PS24W
Front Turn Signal Lamp and Parking Lamp	7443 LL	7443 LL
High-Beam Headlamp (single combined bulb on GMC)	9005 LL	HIR–2 (9012 LL)
Low-Beam Headlamp	H11 LL	---
Marker Lamps	194	194
License Plate Lamp	W5W LL	W5W LL
Stop lamp/Tail lamp/Turn Signal Lamp	7444 LL	7444LL
Stop lamp/Turn Signal Lamp/Tail lamp (*Chassis Cab use only)	1157	1157

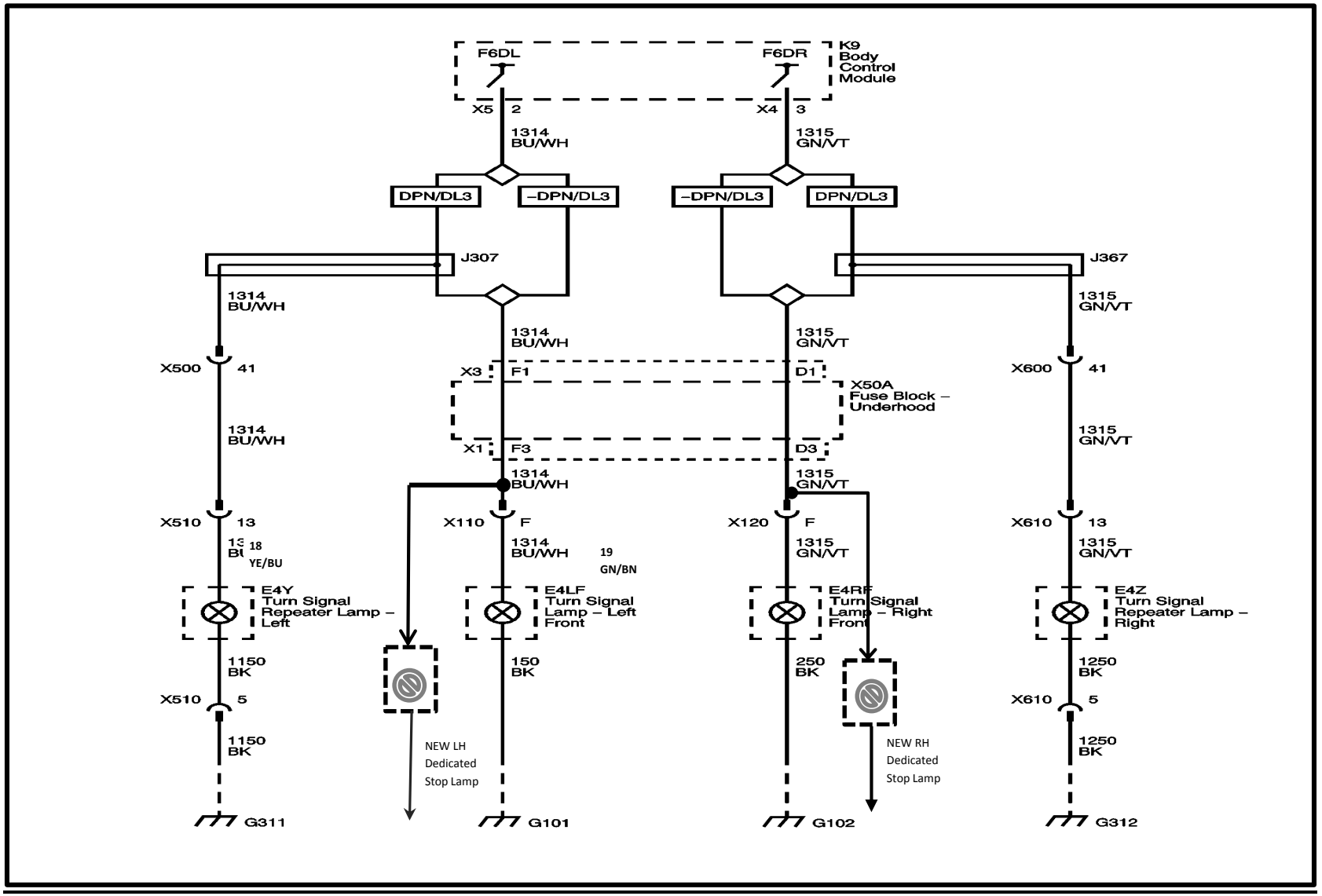
Rearward Lighting Separate Stop and Turn

In order to have separated rear stop and turn you must re-wire the rear lamps at the under hood fuse block such that the Stop[lamps are served by that of the CHMSL signal and the rear turn lamps are serve by splicing those lamp feeds to that of the front turn signal lamp feeds. Follow the steps outlined below using the schematic on the following page as a reference.

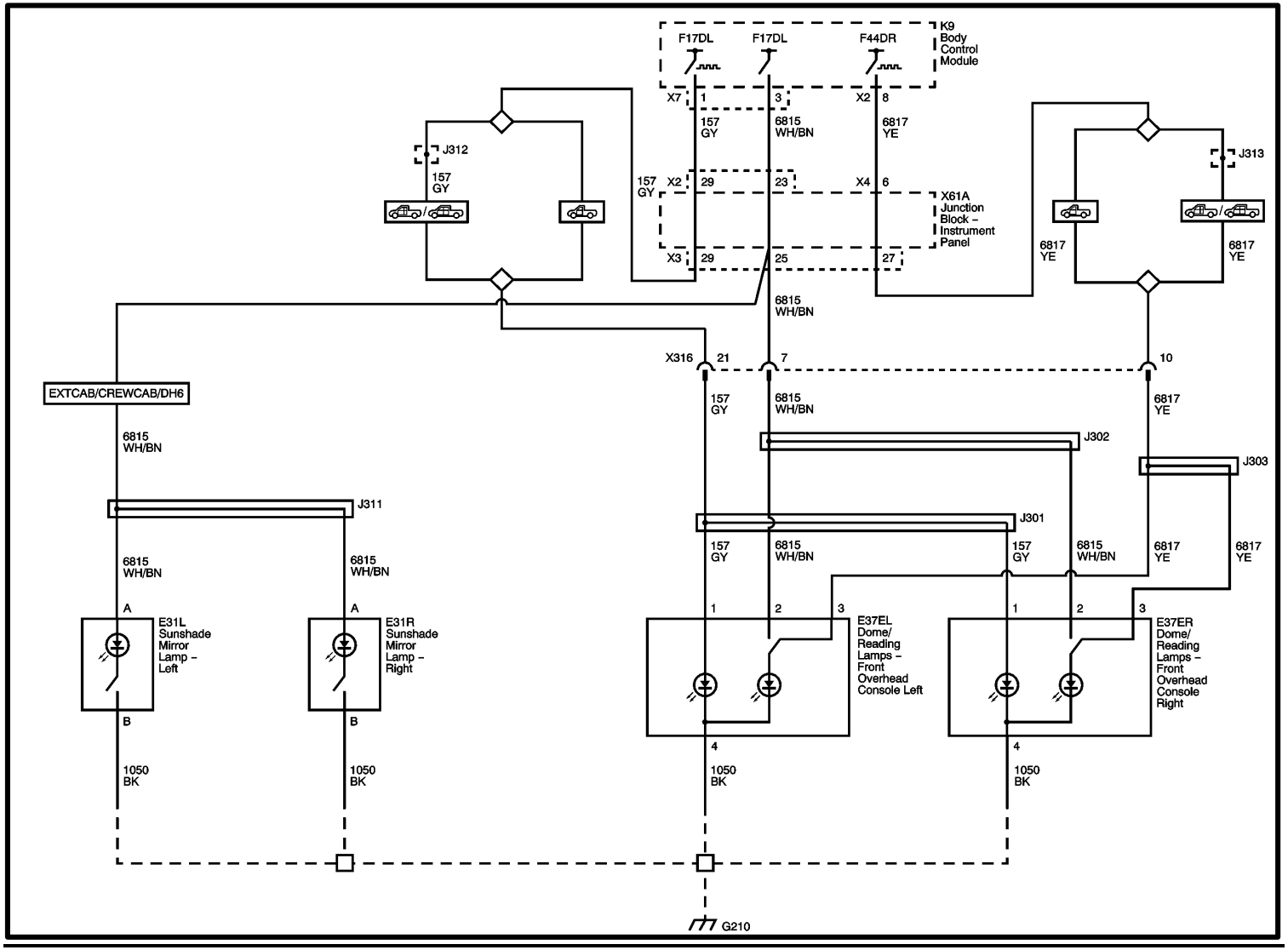
1. Prior to starting you must disconnect the rear chassis lighting connector (X63A), turn on ignition, and select either right or left hand turn signal to determine if the vehicle has been properly calibrated. If you experience a "fast flash" the vehicle is not calibrated with the ZW9 (box delete) option. The ZW9 calibration eliminates the bulb outage detection on the rear lamps and therefore also eliminates the "fast flash" when using after-market (non-OEM) taillight assemblies, including the LED style lamps.
2. Locate the Violet/Gray wire (Circuit #1054) the under-hood fuse block connector X3 /terminal M6. This is the CHSML feed and you will need to splice into this wire for your Stop lamp signal.
3. For Left Rear Turn Only locate and cut circuit 18 (Yellow/Blue wire) at the Under-hood fuse block connector X5 Terminal A2. Locate and splice to the yellow/blue wire to the blue/white wire circuit 1314 X1 terminal F3 at the under-hood fuse block.
4. For Right Rear Turn Only locate and cut circuit 19 (Green/Brown) at the Under-hood fuse block connector X5 Terminal A3. Locate and splice to the Green/Brown wire to the Green/Violet wire circuit 1315 X1 terminal D3 at the under-hood fuse block.
5. Current Limitation is 6 amps…If you current draw is more than 6 amps you must use the front turn signal circuits to energized relays provide Battery positive feed to the rear dedicated turn lamps.

See Schematic(s) on next page

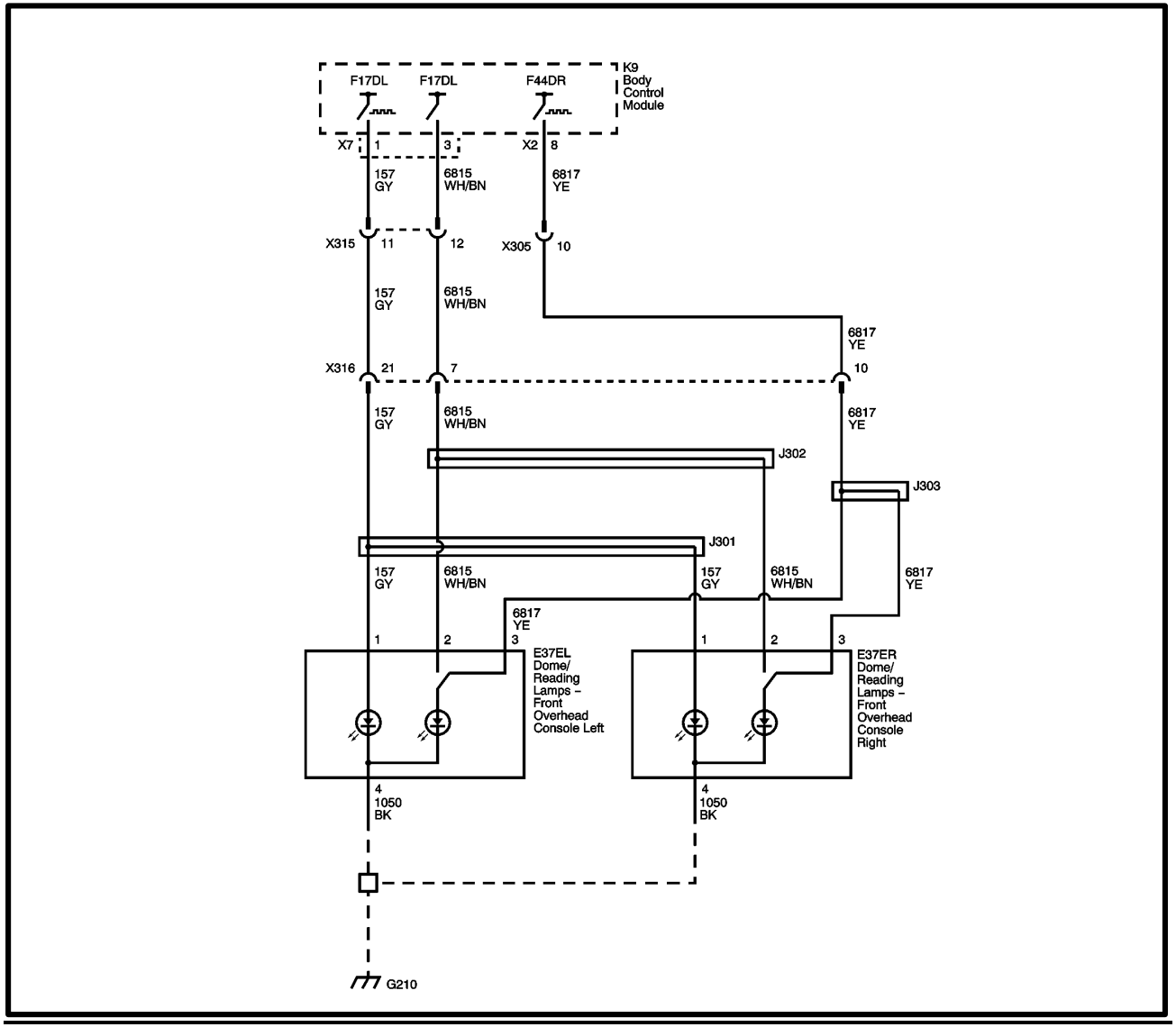
Rearward Lighting Separate Stop and Turn (continued)



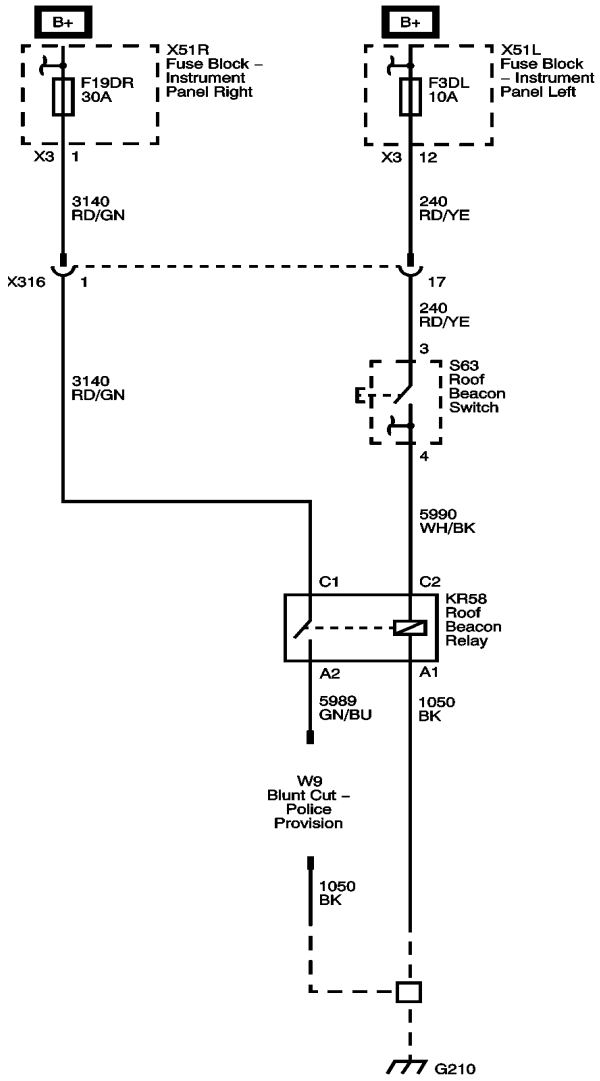
Dome/Courtesy Lamps (-E29), DH6



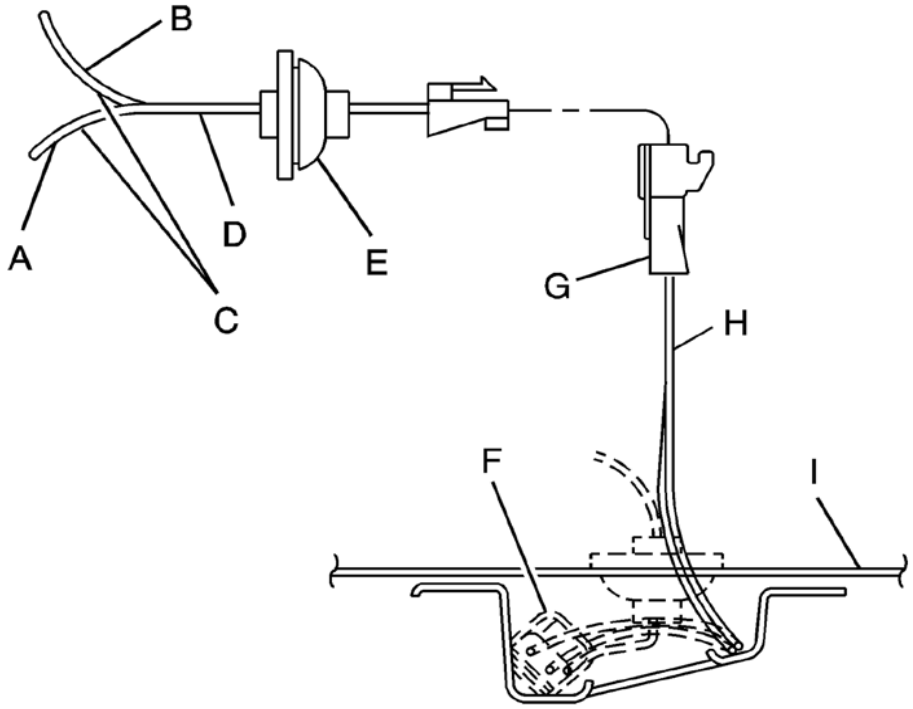
Dome/Courtesy Lamps E29



Roof Mounted Beacon



A. Black Wire
B. Orange Wire
C. To Roof Mounted Lamp
D. Harness Assembly
E. Grommet (Roof)
F. Foam Insulator (Adhesive-Backed)
G. Harness Connector, Secondary Lock and Terminal
H Brown Black Wire
I. Vehicle Outer Roof Panel



Park Neutral Signal-Shift Lock Control

The Automatic Transmission Shift Lock Control System is a safety device that prevents an inadvertent shift out of PARK when the engine is running. The driver must press the brake pedal before moving the shift lever out of the PARK position. The system consists of the following components:

- The Automatic Transmission Shift Lock Solenoid (serviced as the Automatic Transmission Shift Lock Actuator)
- The Body Control Module (BCM)
- The Engine Control Module (ECM)

The BCM controls the voltage to the shift lock control solenoid though the shift lock control solenoid controlled voltage circuit. The following conditions must be met before the BCM will supply voltage to the shift lock control solenoid:

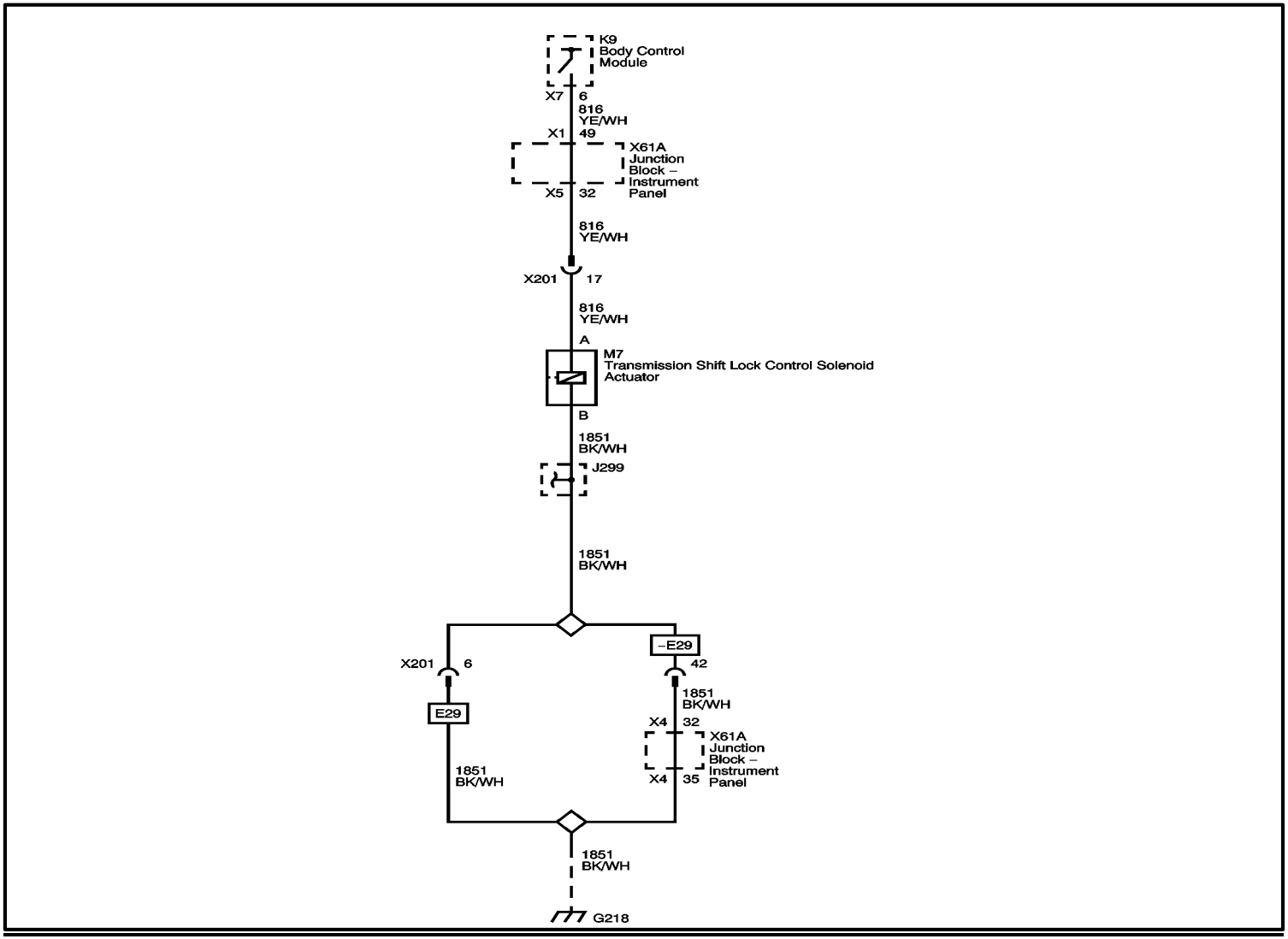
- The ignition is in the ON position.
- The ECM sends an input via GMLAN serial data to the BCM when the Transmission Control Module (TCM) indicates the transmission is in the PARK position.
- The BCM receives a brake applied input from the stop lamp switch.

Since the shift lock control solenoid is permanently grounded, the BCM supplies voltage to the automatic transmission shift lock control solenoid, releasing the mechanical lock on the shift lever as the solenoid energizes. The energized solenoid allows the driver to move the shift lever out of the PARK position. When the brake pedal is not applied, the BCM turns the control voltage output of the shift lock control solenoid OFF, de-energizing the shift lock control solenoid. When the transmission is in the PARK position, the de-energized shift lock control solenoid will prevent shifting as the lever is mechanically locked in the PARK position.

During remote start operation, the BCM will energize the shift lock control circuit, locking the shift lever in the PARK position.

Note:
Shift Lock Control can be used as simulated Park signal, but note that the signal is deactivated if and when the brake is applied. Refer to wiring schematic on the next page for connection recommendations.

Shift Lock Control Schematic



Trailer Brake Control System

A trailer brake control system is used to control the amount of trailer braking power that is made available to trailers with brakes that require a controlled electrical output signal for actuation.

The power output to the trailer brakes is based on both the amount of braking being applied by the vehicle's brake system and on the type of trailer brakes detected.

The Trailer Brake Control System is compatible with two types of Trailer Brake Systems as listed below:

1. *Electric Brakes* A controlled electrical output signal energizes an electric-magnet/lever arm assembly that directly actuates the brake mechanism. The GDS name for this system is "Electromagnetic Brakes".

2. *Electric Over Hydraulic Brakes* A controlled electrical output signal energizes a remote, trailer mounted hydraulic pump to build brake pressure in a closed hydraulic system on the trailer. The hydraulic fluid pressure actuates the brake mechanism. The GDS name for this system is "Electrohydraulic Brakes".

Trailer Brake Output versus Trailer Brake Type

- The trailer brake system characterizes the trailer brakes as either Electric Brake or Electric Over Hydraulic Brake automatically. This characterization may be affected by the number, type, and age of the trailer brake magnets, as well as any other devices installed on the trailer brakes (i.e. adapters for Electric Over Hydraulic brake functionality).

- The trailer brake system is fully operational with either characterization.

- Some features of the trailer brake system may be different based on the trailer brake type characterization. An example of this is at zero speed, where pressing the service brake pedal will produce output when the trailer brakes are characterized as Electric Brakes, but not when characterized as Electric Over Hydraulic Brakes.

- Sliding the manual trailer brake apply lever will produce output at zero speed for either characterization.

The user gain allows the driver to adjust the amount of trailer brake output to match the trailer load and road surface. The controller determines the desired trailer brake output and provides a control signal to the K133 Trailer Brake Power Control Module. The K133 Trailer Brake Power Control Module amplifies the signal and provides the output required to activate the Electric or Electric-Over Hydraulic trailer brakes.

The trailer brake control can support up to a maximum of four axles with electric trailer brakes (8 brake magnets).

Connecting a trailer that is not compatible with the trailer brake system may result in reduced or complete loss of trailer braking. There may be an increase in stopping distance or trailer instability which could result in personal injury or damage to the vehicle, trailer or other property. An aftermarket controller may be available for use with trailers with surge or air trailer brake systems.

To determine the type of brakes on your trailer and the availability of controllers, check with your trailer manufacturer or dealer. Do not power up an aftermarket controller with the factory brake controller at the same time.

The vehicle is equipped with the following trailer braking components:

- K38 Chassis Control Module
- K133 Trailer Brake Power Control Module
- S76 Trailer Brake Control Panel
- Manual Trailer Brake Apply
- Trailer Gain Adjustment
- Trailer Brake Driver Information Center Display

Chassis Control Module

The K38 Chassis Control Module (CCM) is a serviceable GMLAN module. The chassis control module sends the low power commanded duty cycle signal to the trailer brake power control module. The trailer brake power control module amplifies the signal and provides an output that is required to drive the trailer brakes.

Trailer Brake Power Control Module

The K133 Trailer Brake Power Control Module (TBPM) is a solid state power switching module that supplies power to the trailer brakes at the input command duty cycle. Diagnostic messages are sent from the TBPM to the CCM on a dedicated LIN bus.

Trailer Brake Control Panel

The S76 Trailer Brake Control Panel contains the trailer gain and manual apply switches. It is located on the instrument panel to the left of the steering column. Refer to the instrument panel overview for more information on the location. The control panel and switches allows you to adjust the amount of output, referred to as trailer gain, available to the Electric or Electric Over Hydraulic brakes. It also allows you to manually apply the trailer brakes. The trailer brake control panel and switches are used along with the trailer brake display page on the driver information center to adjust and display power output to the trailer brakes.

Manual Trailer Brake Apply

The manual trailer brake apply lever is located on the S76 Trailer Brake Control Panel and is used to apply the trailer's Electric or Electric Over Hydraulic brakes independent of the vehicle's brakes. This lever is used in the trailer gain adjustment procedure to properly adjust the power output to the trailer brakes.

Sliding the lever to the left will apply only the trailer brakes. The power output to the trailer is indicated in the trailer brake display page in the Driver Information Center (DIC). If the vehicle's service brakes are applied while using the manual trailer brake apply lever, the trailer output power will be the greater of the two.

The trailer and the vehicle's brake lamps will come on when either the vehicle's braking or manual trailer brakes are applied.

Trailer Gain Adjustment

Trailer gain should be set for a specific trailering condition and must be adjusted any time vehicle loading, trailer loading or road surface conditions change. It is important to re-adjust trailer gain any time the tow vehicle, trailer loading or road surface conditions change or it you notice trailer wheel lock-up at any time while you are towing.

Setting the trailer gain properly is needed for the best trailer stopping performance. A trailer that is over-gained may result in locked trailer brakes. A trailer that is under-gained may result in not enough trailer braking. Both of these conditions may result in poor stopping and stability of the vehicle and trailer.

Trailer Gain Adjustment Procedure

- Adjust trailer gain in 0.5 step increments up to 10 gain setting by using the gain adjustment +/− buttons on the trailer brake control panel switch. Pressing and holding a gain button will cause the trailer gain to continuously increment or decrement. To turn the output to the trailer off, set the gain to zero.
- Drive the tow vehicle and trailer combination on a level surface representative of the towing condition and free of traffic at approximately 32–40 km/h (20–25 mph) and fully apply the manual trailer brake apply lever mechanism located on the trailer brake control panel switch. Adjusting the trailer gain at slower speeds may result in an incorrect gain setting.
- Adjust the trailer gain to just below the threshold of trailer wheel lock-up . Trailer wheel lock-up may not occur if towing a heavily loaded trailer. In this case, adjust the trailer gain to the highest allowable setting for the towing condition.

Hill Start Assist

The hill start assist allows the driver to launch the vehicle without a roll back when the driver is moving their foot from the brake pedal to the accelerator pedal. Refer to the hill start assist system in the anti-lock brake system description and operation document for more information.

Trailer Sway Control

The trailer sway control can detect the vehicle yaw instability, caused by an attached trailer. Refer to the trailer sway control system in the anti-lock brake system description and operation document for more information.

Driver Information Center Indicators and Messages (Trailer Brake System)

The following indicators are used to inform the driver of several different conditions:

Trailer Connected

This message will be briefly displayed when a trailer with Electric or Electric Over Hydraulic brakes is first connected to the vehicle. This message will automatically turn off in about ten seconds. The driver can also acknowledge this message before it automatically turns off.

Check Trailer Wiring

This message will be displayed if:

- The system detects that a trailer with Electric or Electric Over Hydraulic brakes is connected to the vehicle and then the trailer harness becomes disconnected from the vehicle.
- The trailer connection is recognized initially and then a disconnect occurs while the vehicle is stationary. This message will automatically turn off in about thirty seconds. This message will also turn off if the driver acknowledges this message off or if the trailer harness is reconnected.
- A disconnect of the trailer wiring harness occurs while the vehicle is moving. The Check Trailer Wiring message will continue until the ignition is turned off. The message will also turn off if the driver acknowledges this message off or it the trailer harness is re-connected or repairs are completed.
- There is an electrical fault in the wiring to the electric trailer brakes. The Check Trailer Wiring message will continue as long as there is an electrical fault in the trailer wiring. This message will also turn off if the driver acknowledges this message off.
- A poor connection at the 7–way connector may cause the Check Trailer Wiring message. Some aftermarket 7–way trailer side connector adapters or plugs may cause deformation or excessive wear to the vehicle's trailer terminals. It is recommended that you use an OEM or Pollak heavy duty 7–way trailer side connector adapter.

Service Trailer Brake System

This message will be displayed when there is a problem with the trailer brake control system. The trailer brake system may not be fully functional, or may not be functioning at all. The trailer brake system is designed to provide trailer braking, if possible, even when faults prevent it from being fully functional. This reduced functionality includes:

1. Providing trailer braking when the master cylinder pressure or brake pedal switch are faulted.
2. Providing trailer braking when hill start assist and trailer sway control communication is faulted.
3. Providing trailer braking when certain manual trailer brake apply lever faults are present.

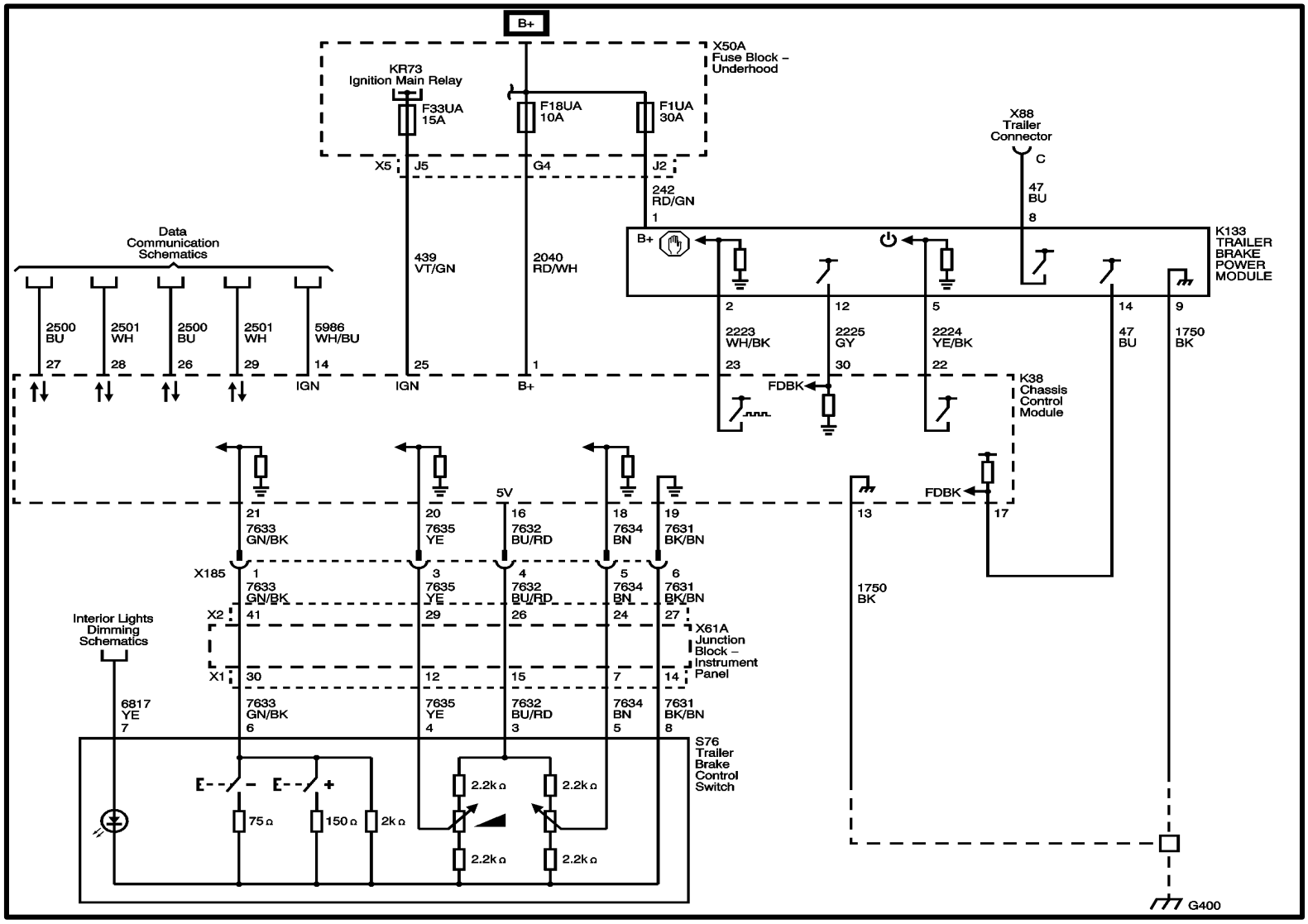
These conditions should be repaired to allow the trailer brake system to be fully functional.

Trailer Gain and Output Display

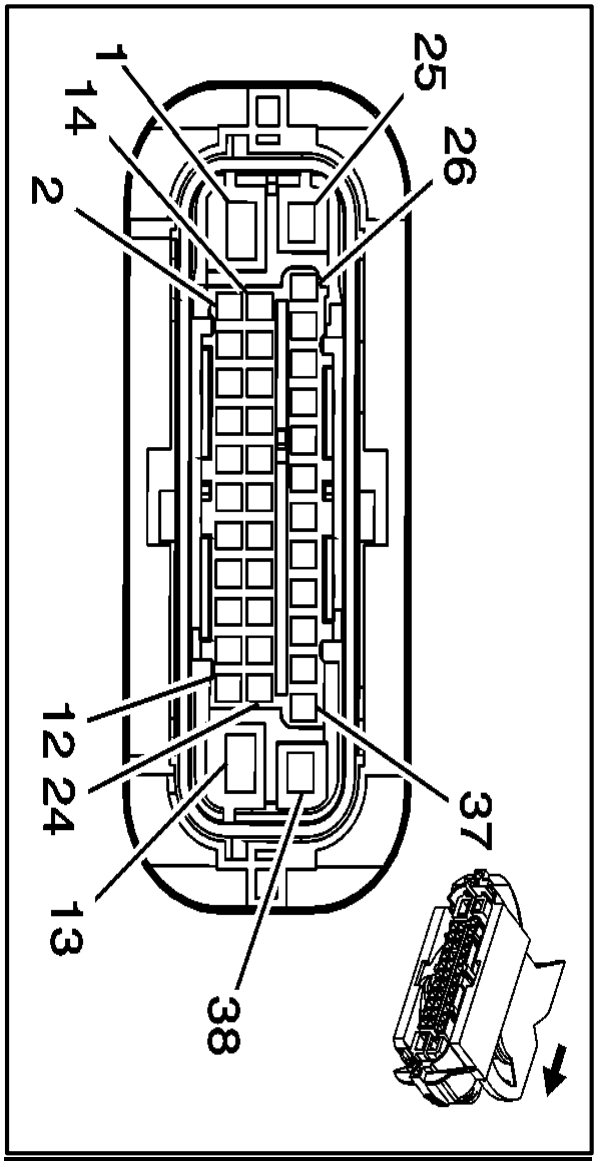
This display menu can be accessed by scrolling through the DIC menu, or any time the trailer gain +/− button is depressed, or the manual trailer brake apply lever is actuated. The trailer output is displayed from 0 to full output and indicates the output power provided to the trailer brakes, relative to the gain setting.

After the electrical connection is made to a trailer equipped with electric brakes or electric over hydraulic brakes, the TRAILER CONNECTED message will be displayed momentarily on the DIC. The Trailer Brake Display Page can be selected on the DIC showing TRAILER GAIN and OUTPUT, after all vehicle related service messages are acknowledged by the driver. Depending on which instrument panel cluster is in the vehicle, the DIC may display dashed lines, a greyed out display, or it may be blank signifying a disconnected trailer or a trailer brake fault condition.

Trailer Brake Control System Schematic

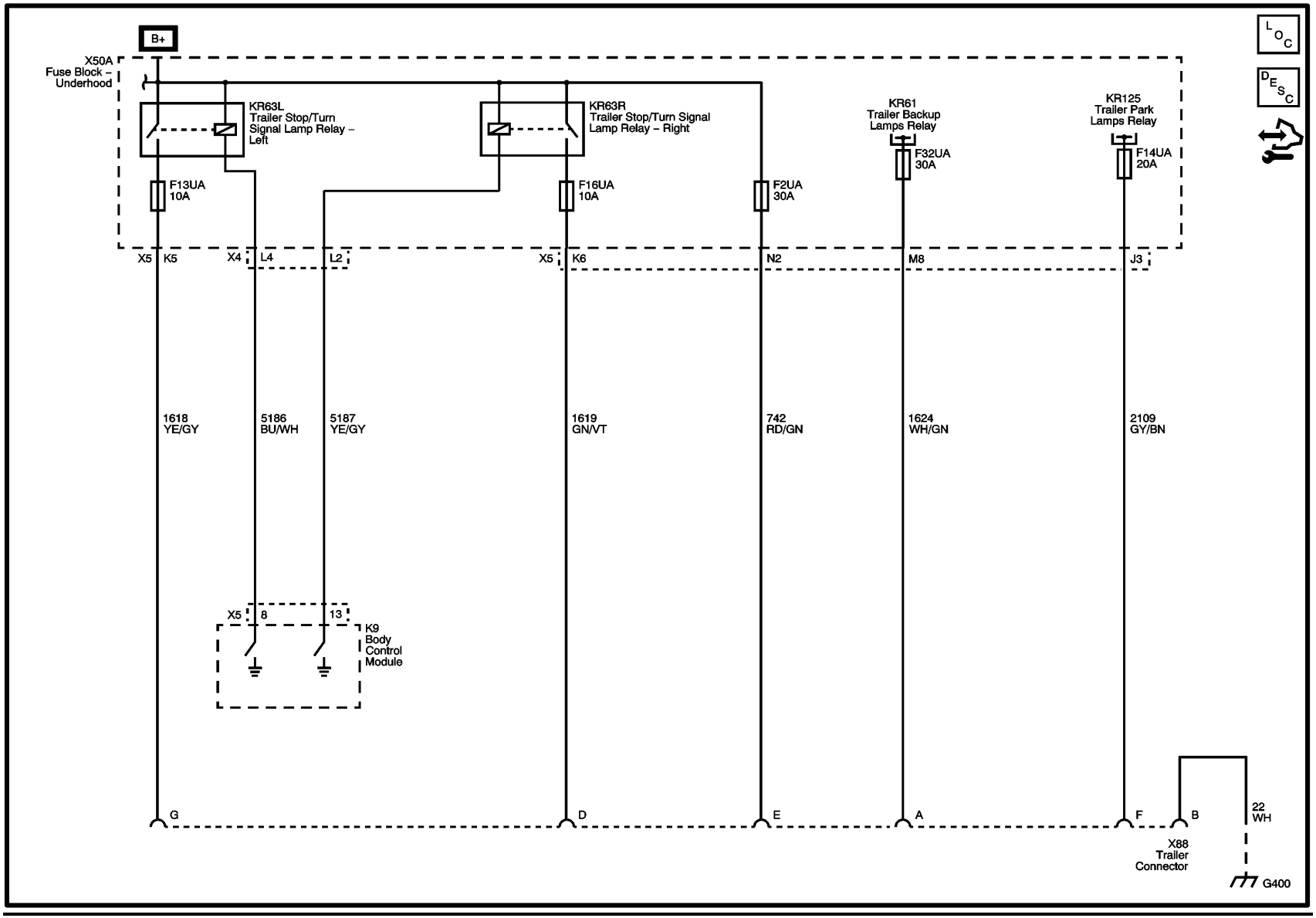


Chassis Control Module Connector

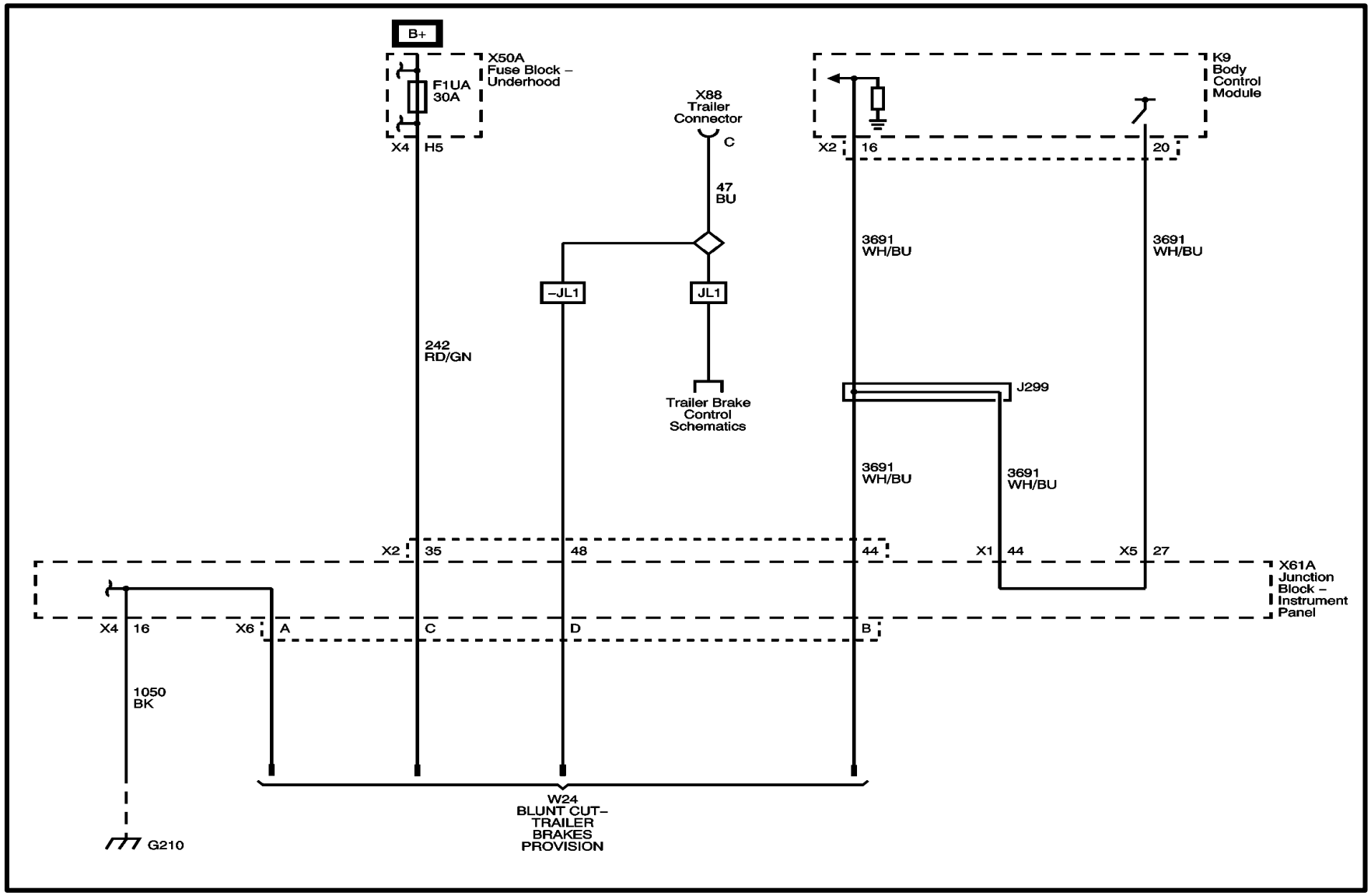


Pin	Size	Color	Circuit	Function
1	2.5	RD/VT	1940	Battery Positive Voltage
2	-	-	-	Not Occupied
3	0.5	BN	3891	Aero Shutter Control
4	0.5	GY	3890	Aero Shutter Control 2
5	0.5	D-BU	2500	High Speed GMLAN Serial Data (+) (1)
6	0.5	D-BU	2500	High Speed GMLAN Serial Data (+) (1)
7	-	-	-	Not Occupied
8	0.5	VT/YE	5985	Accessory Wakeup Serial Data
9-10	-	-	-	Not Occupied
11	0.5	GY	3890	Aero Shutter Control 2
12	0.5	BN	3891	Aero Shutter Control
13-16	-	-	-	Not Occupied
17	0.5	WH	2501	High Speed GMLAN Serial Data (-) (1)
18	0.5	WH	2501	High Speed GMLAN Serial Data (-) (1)
19-20	-	-	-	Not Occupied
21	0.75	PU/L-GN	439	Run/Crank Ignition 1 Voltage
22-24	-	-	-	Not Occupied
25	2.5	BK	2150	Ground
26-38	-	-	-	Not Occupied

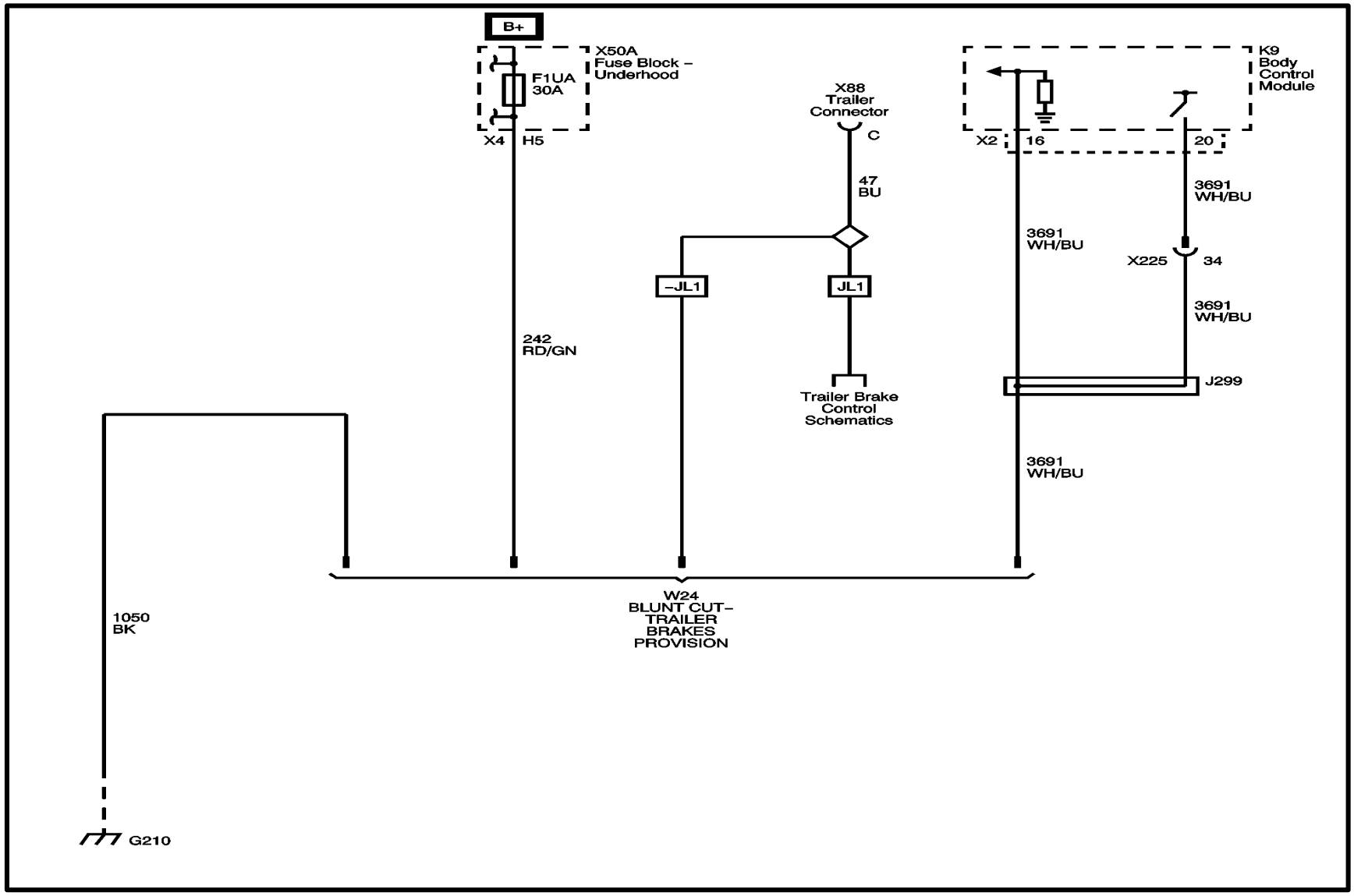
Trailer Connector 1 of 3 (Terminals A, B, D, E, F & G)



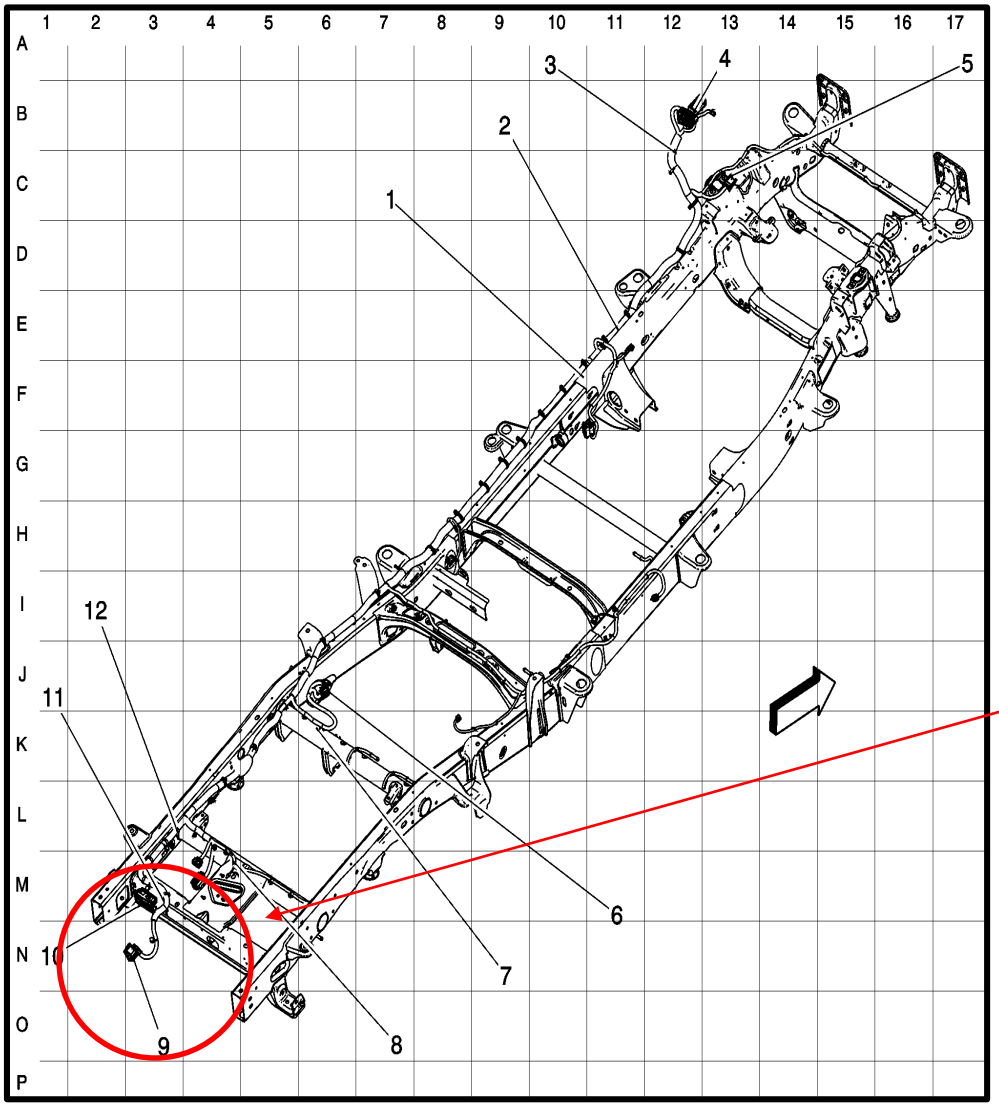
Trailer Connector 2 of 3 (Terminal C except E29)



Trailer Connector 3 of 3 (Terminal C with E29)



Trailer Connector Location



(1) SP29

(2) SP30

(3) SP31

(4) X185

(5) X125

(6) X350

(7) J375

(8) SP27

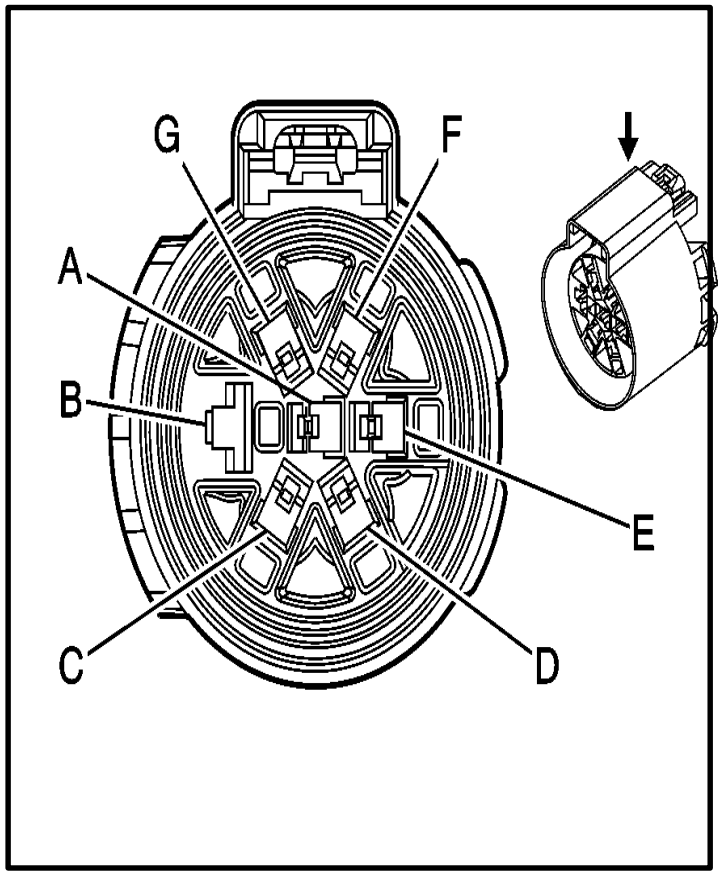
(9) X88 Trailer Connector

(10) X63A Junction Block – Rear Body

(11) SP111

(12) SP28

Trailer Connector Pin Out



Pin	Size	Color	Circuit	Function
A	0.75	WH/L-GN	1624	Trailer Backup Lamp Supply Voltage
B	5	WH	22	Trailer Ground
C	2.5	D-BU	47	Trailer Auxiliary Supply Voltage
D	0.75	L-GN/VT	1619	Right Rear Trailer Stop/Turn Lamp Supply Voltage
E	4	RD/L-GN	742	Battery Positive Voltage
F	1.5	GY/BN	2109	Trailer Park Lamp Supply Voltage
G	0.75	YE/GY	1618	Left Rear Trailer Stop/Turn Lamp Supply Voltage

Section B

Understanding the Alpha Numeric Naming Convention

Fuse, Relay, and Block Names

If a block has text-based names on a label of some sort, those will only appear in the Electrical Center Identification Views Usage Table. Refer to the Electrical Center Identification Views topic for additional information.

Fuse Names

Fuse names depend on whether they are an inline fuse, or if they are located within a block. Inline fuses are assigned a component code/name, while fuses located within a block use the following strategy:

Fuse names within blocks will be identified by four characters described below:

1st Character

- F = Fuse, Circuit Breaker
- R = Diodes, Resistors

2nd Character

Position number within the block

3rd Character

Alpha character defining the block position within the vehicle

- U = Engine Compartment (Underhood)
- D = I/P (within instrument panel)
- P = Passenger Compartment (not in I/P, can be in center console)
- R = Body Rear (Rear of the Passenger Compartment or Rear Compartment)
- B = Battery or Auxiliary Battery
- H = Fuse Holder

4th Character

Alpha character (start with A, B, C,…) at the end identifying whether there is more than one block residing in the same area on the vehicle within the same vehicle publication.

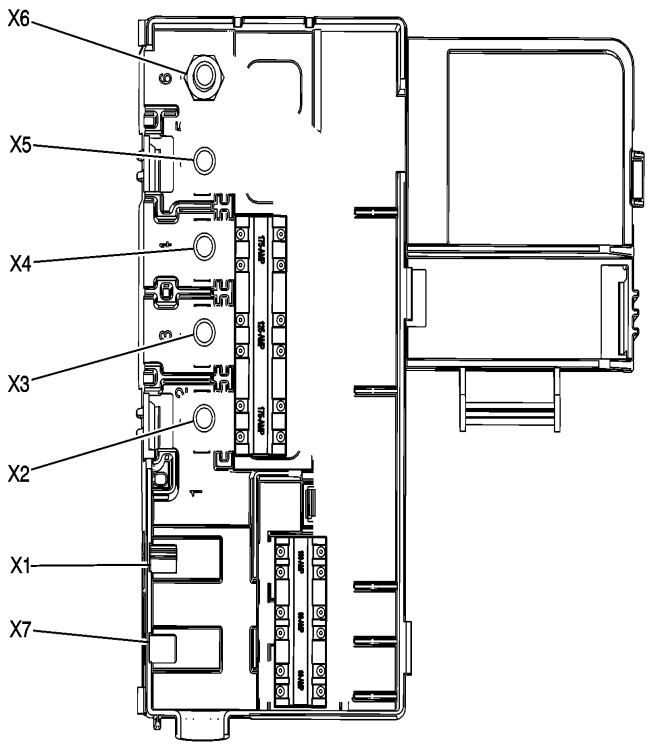
Example:

- Fuse 11 of a vehicle with a single block within the engine compartment would be F11UA
- Fuse 13 of a vehicle with two blocks within the engine compartment would be F13UA and F13UB

Only the assigned names, described above will appear on the schematic graphic. Both the assigned name and the name on the label, (if equipped) will appear in the block usage table in the Electrical Center Identification Views.

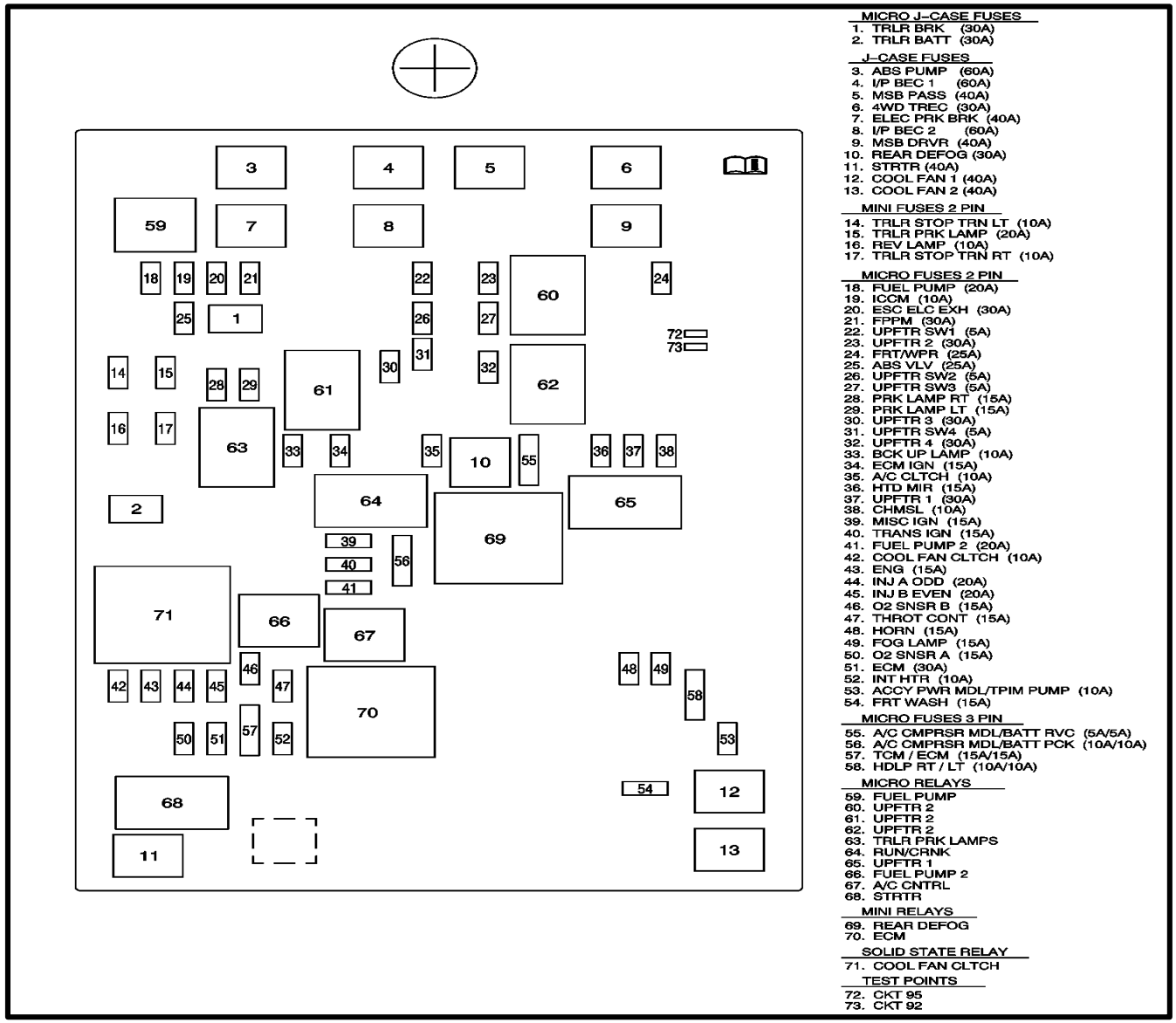
If block has fuse numbers on the label that repeat (typically based on fuse type), make the 4th character unique for each type. For example, use A for 1 type, B for second type, and so on. Additionally, if there are multiple blocks within the same zone, the 4th character can be assigned based on position. For example, if the instrument panel had two fuse blocks, one at each end, the 4th position can be L for the block on the left and R for the block on the right.

Battery Fuse Block –Top View

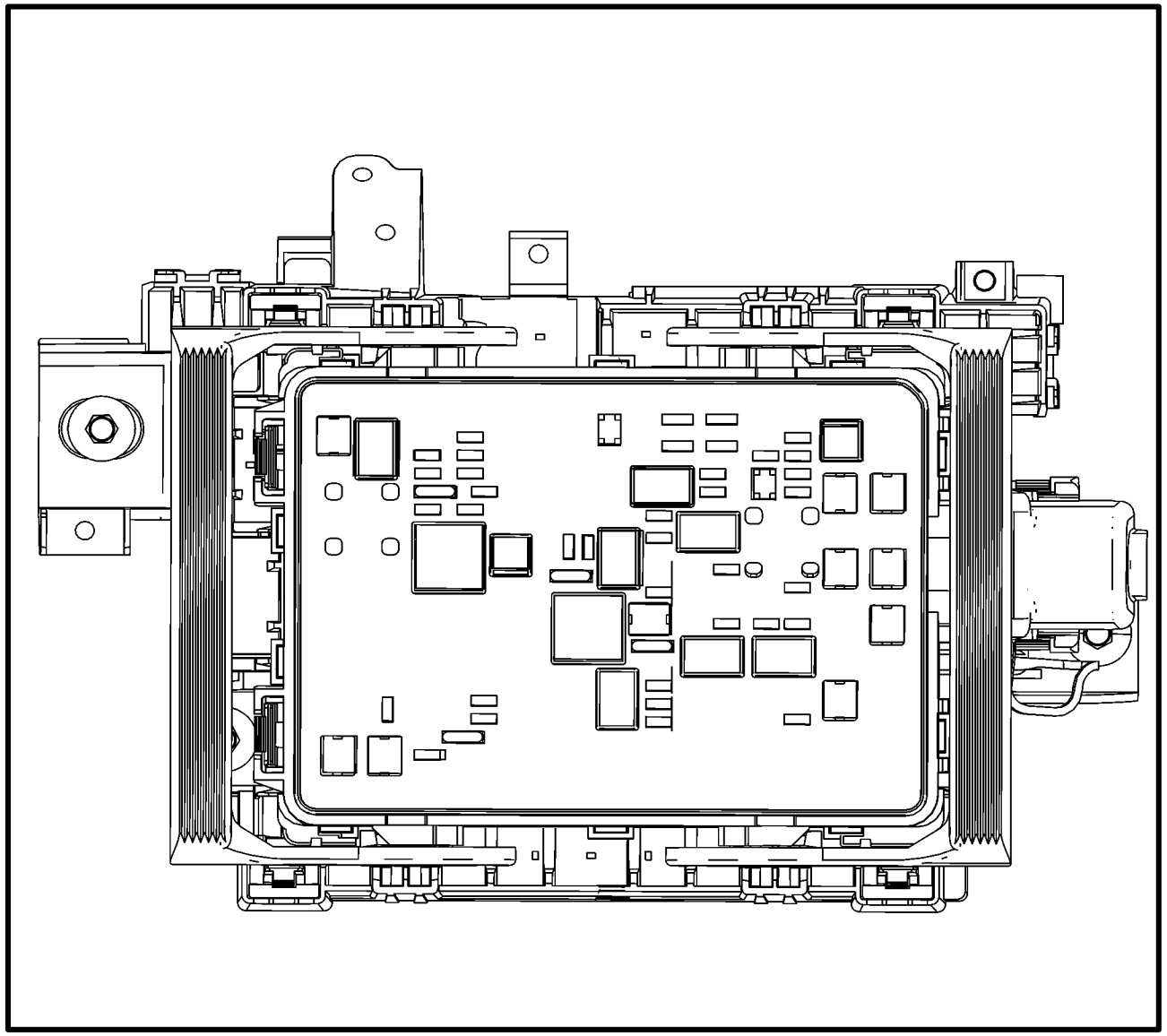


No.	Device Assigned Name	Rating	Description
X1	**F4UD**	**175A**	**K34 Power Steering Control Module (K4B), M64 Starter Motor**
X2	**F3UD**	**125A**	**Not Used**
X3	**F2UD**	**175A**	**G13 Generator (KW5), X50A Fuse Block-Underhood, X55J Fuse Holder-Generator (KW5)**
X4	**F1UD**	**100A**	**Not Used**
X5	**F7UD**	**60A**	**X51R Fuse Block-Instrument Panel Right**
X6	**F6DA**	**60A**	**X51R Fuse Block-Instrument Panel Right**

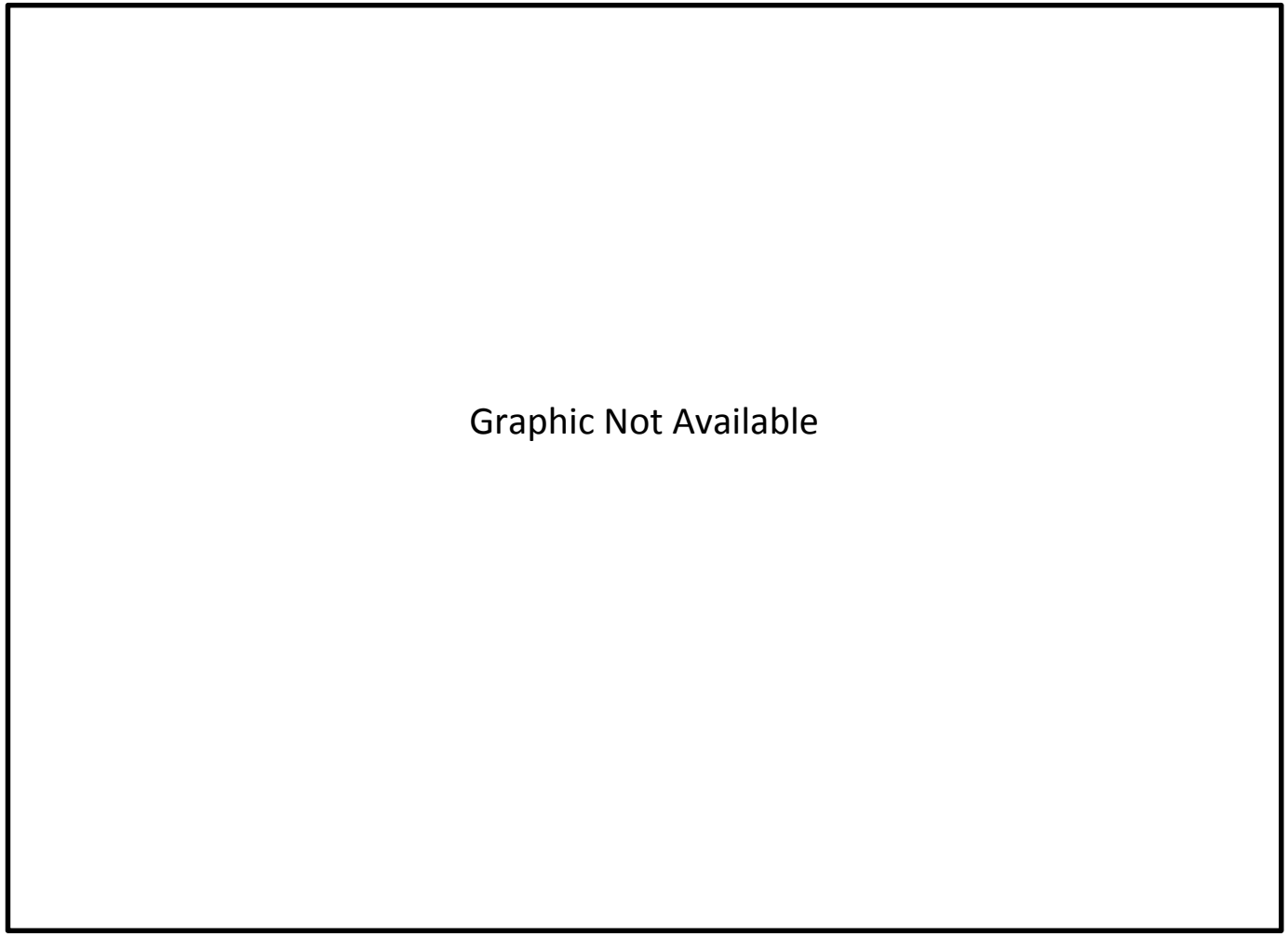
Fuse Block (X50) Under-hood - Label



Fuse Block (X50) Under-hood - Top View



Fuse Block (X50) Under-hood - Bottom View



X50A Fuse Block – Under-hood Label Usage				
No.	**Device Label Name**	**Device Assigned Name**	**Rating**	**Description**
Micro J-Case Fuses				
01	TRLR BRK	F1UA	30 A	Blunt Cut (E29), X61A Junction Clock-Instrument Panel (-E29)
02	TRLR BATT	F2UA	30 A	C1B Battery Auxiliary (K4B), X88 Trailer Connector
J-Case Fuses				
03	ABS PUMP	F3UA	60 A	K17 Electronic Brake Control Module
04	I/P BEC 1	F4UA	50 A	F6DL, F7DL, F8DL, F9DL,F17DL, F25DL, F26DL, F34DL, F44DL, F45DL
05	MSB PASS	F5UA	40 A	Not Used
06	ELEC PRK BRK	F6UA	40 A	Not Used
07	IP BEC 2	F7UA	50 A	F3DL, F11DL, F13DL, F29DL, F38DL, F40DL, F41DL, KR74 Ignition Run Relay, KR76A Retained Accessory Power Relay 1
08	MSB DRVR	F8UA	40 A	Not Used
09	REAR DEFOG	F9UA	30 A	E18 Rear Defogger Grid
10	STRTR	F10UA	40 A	KR27 Starter Relay
11	COOL FAN 1	F11UA	40 A	G10L Cooling Fan Motor-Left
12	COOL FAN 2	F12UA	40 A	G10R Cooling Fan Motor-Right
Mini Fuses 2 Pin				
13	TRLR STOP TRN LT	F13UA	10 A	X88 Trailer Connector
14	TRLR PRK LAMP	F14UA	20 A	X88 Trailer Connector
15	REV LAMP	F15UA	10 A	A10 Inside Rearview Mirror, B87 Rearview Camera, E5E Tail Lamp-Left, E5F Tail Lamp-Right
16	TRLR STOP TRN RT	F16UA	10 A	X88 Trailer Connector

X50A Fuse Block – Under-hood Label Usage				
No.	**Device Label Name**	**Device Assigned Name**	**Rating**	**Description**
Micro Fuses 2 Pin				
17	FUEL PUMP	F17UA	20 A	KR23A Fuel Pump Relay
18	ICCM	F18UA	10 A	K38 Chassis Control Module
19	ESC ELC EXH	F19UA	30 A	Not Used
20	FPPM	F20UA	30 A	K111 Fuel Pump Driver Control Module
21	UPFTR SW1	F21UA	5 A	Not Used
22	UPFTR 2	F22UA	30 A	Not Used
23	FRT/WPR	F23UA	25 A	KR12B Windshield Wiper Relay, KR12C Windshield Wiper Speed Control Relay
24	ABS VLV	F24UA	25 A	K17 electronic Brake Control Module
25	UPFTR SW2	—	—	Not Used
26	UPFTR SW3	F26UA	5 A	Not Used
27	PRK LMP RT	F27UA	15 A	E5F Tail Lamp Right, E3RF Rear Fender Clearence Lamp-Right Front (-SRW). E2A Marker Lamp-Endgate (-SRW), E3RR Rear Fender Clearance Lamp-Right Rear, E4D Daytime Running Lamp-Right, E4K Park Lamp-Right Front (X88), E2RF Side Marker Lamp-Right Front (Z88)
28	PRK LMP LT	F28UA	15 A	E5E Tail Lamp Left, E3LF Rear Fender Clearance Lamp-Left Front (-SRW).E3A Roof Clearance Lamp-Left front Outer (U01), E3C Roof Clearance Lamp-Front Middle (U01), E3E Clearance Lamp-Right Front Outer (U01), E3LR Rear Fender Clearance Lamp-Left Rear, E4C Daytime Running Lamp-Left, E4J Park Lamp-Left Front (X88), E2LF Side Marker Lamp-Left Front (Z88)
29	UPFTR 3	F29UA	30 A	Not Used
30	UPFTR SW4	—	—	Not Used
31	UPFTR 4	F31UA	30 A	Not Used
32	BCK UP LAMP	F32UA	10 A	X88 Trailer Connector

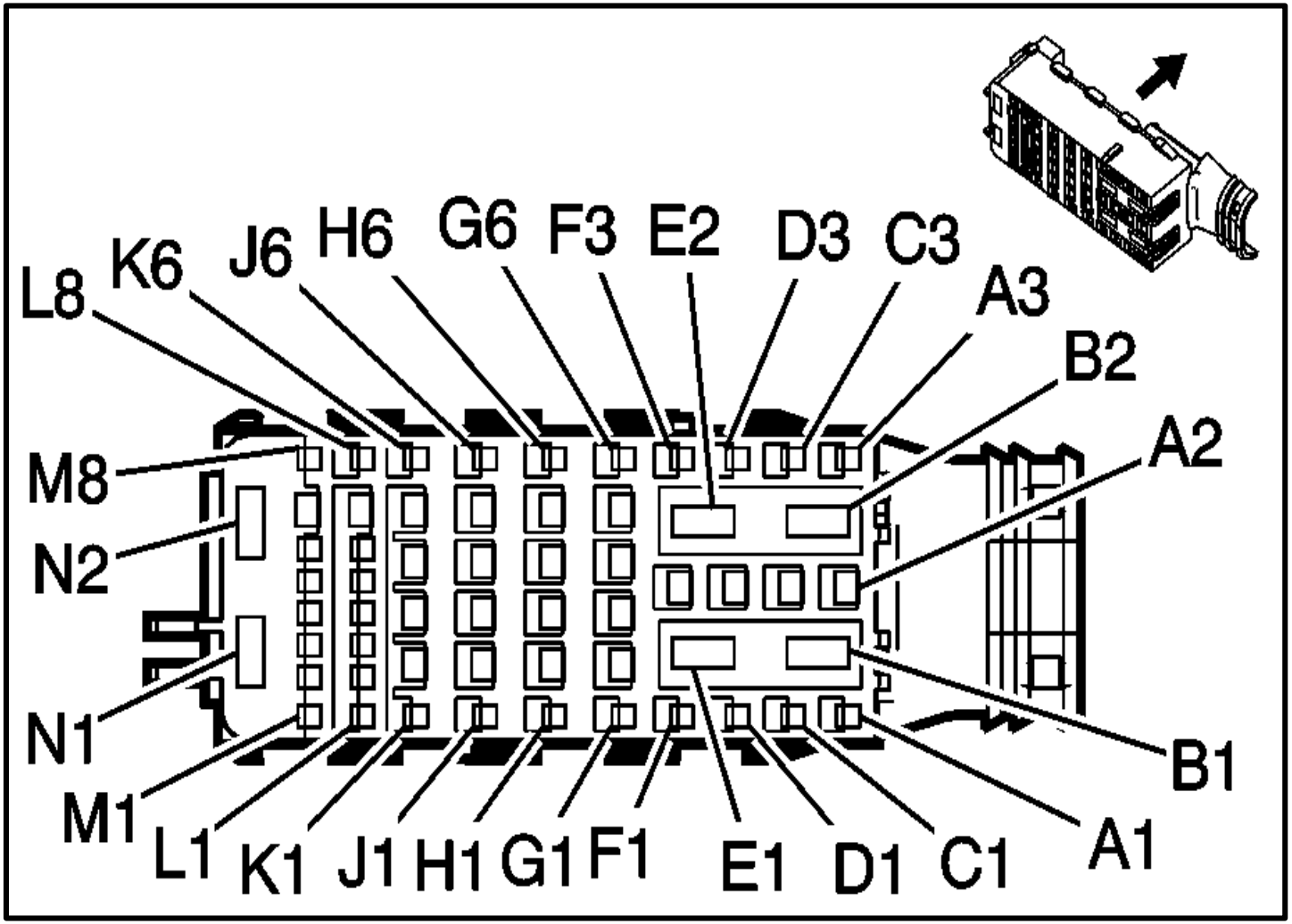
X50A Fuse Block – Under-hood Label Usage				
No.	**Device Label Name**	**Device Assigned Name**	**Rating**	**Description**
33	ECM IGN	F33UA	15 A	K20 Engine Control Module, K38 Chassis Control Module, K111 Fuel Pump Driver Control Module,
34	A/C CLTCH	F34UA	10 A	KR29 A/C Compressor Clutch Relay
35	HTD MIR	F35UA	15 A	E17D Outside Rearview Mirror Glass-Driver, E17P Outside Rearview Mirror Glass-Passenger
36	UPFTR 1	F36UA	30 A	Not Used
37	CHMSL	F37UA	10 A	E6 Center High Mounted Stop Lamp
38	MISC IGN	F38UA	10 A	Not Used
39	TRANS IGN	F39UA	15 A	T12 Automatic Transmission Assembly, M26 Front Axle Engagement Actuator, K69 Transfer Case Control Module
40	FUEL PUMP 2	—	—	Not Used
41	COOL FAN CLTCH	—	—	Not Used
42	ENG	F42UA	15 A	B75C Multi Function Intake Air Sensor
43	INJ A ODD	F43UA	20 A	K20 Engine Control Module, T8A Ignition Coil 1, T8C Ignition Coil 3, T8E Ignition Coil 5, T8G Ignition Coil 7
44	INJ B EVEN	F44UA	20 A	K20 Engine Control Module, T8B Ignition Coil 2, T8D Ignition Coil 4, T8F Ignition Coil 6, T8H Ignition Coil 8
45	O2 SNSR B	F45UA	15 A	B52D Heated Oxygen Sensor Bank 1 Sensor 2, B52F Heated Oxygen Sensor-Bank 2 Sensor 2
46	THROT CONT	F46UA	15 A	Not Used
47	HORN	F47UA	15 A	P12 Horn
48	FOG LAMP	F48UA	15 A	E29LF Fog Lamp-Left Front, E29RF Fog Lamp-Right Front
49	O2 SNSR A	F49UA	15 A	B52C Heated Oxygen Sensor Bank 1 Sensor 1, B52E Heated Oxygen Sensor-Bank 2 Sensor 1, Q12 Evaporative Emission Purge Solenoid Valve, Q43

X50A Fuse Block – Under-hood Label Usage				
No.	**Device Label Name**	**Device Assigned Name**	**Rating**	**Description**
				Valve Lifter Oil Manifold Assembly, Q44 Engine Oil Pressure Control Solenoid Valve
50	ECM	F50UA	30 A	K20 Engine Control Module
51	INT HTR	F51UA	10 A	Not Used
52	ACCY PWR MDL/TPIM PUMP	F52UA	10 A	Not Used
53	FRT WASH	F53UA	15 A	G24 Windshield Washer Pump
Micro Fuses 3 Pin				
54	A/C CMPRSR MDL/BATT RVC	F54UA	5A/5A	K20 Body Control Module
55	A/C CMPRSR MDL/BATT PCK	F55UA	10A/10A	Not Used
56	TCM / ECM	F56UA	15A/15A	K20 Engine Control Module Q13 Evaporative Emission Vent Solenoid Valve, T12 Automatic Transmission Assembly
57	HDLP RT / LT	F57UA	10A/10A	E4E Headlamp-Left High Beam (X88), E4F Headlamp-Right High Beam (X88), M28L High Beam Solenoid Actuator-Left (Z88), M28R High Beam Solenoid Actuator-Right (Z88)
Micro Relays				
58	FUEL PUMP	KR23A Fuel Pump Relay	—	G12 Fuel Pump
59	UPFTR 2	—	—	Not Used
60	UPFTR 3	—	—	Not Used

X50A Fuse Block – Under-hood Label Usage				
No.	**Device Label Name**	**Device Assigned Name**	**Rating**	**Description**
61	UPFTR 4	—	—	Not Used
62	TRLR PRK LAMPS	KR125 Trailer Park Lamps Relay	—	F14UA, F27UA, F28UA, K20 Body Control Module
63	RUN/CRNK	KR73 Ignition Main relay	—	F33UA, F38UA, F39UA, F55UA, K9 Body Control Module
64	UPFTR 1	—	—	Not Used
65	FUEL PUMP 2	—	—	Not Used
66	A/C CNTRL	KR29 A/C Compressor Clutch Relay	—	Q2 A/C Compressor Clutch, K20 Engine Control Module
67	STRTR	KR27 Starter Relay	—	M64 Starter Motor
Mini Relays				
68	REAR DEFOG	KR5 Rear Defogger Relay	—	F9UA, F35UA
69	ECM	KR75 Engine Controls Ignition Relay	—	F41UA, F42UA, F43UA, F44UA, F45UA, F46UA, F49UA, F50UA, KR29
Solid State Relays				
70	COOL FAN CLTCH	—	—	Not Used
Test Points				
71	CKT 95	71	—	—
72	CKT 92	72	—	—
Note: Relays listed below are **non**-serviceable Printed Circuit Board (PCB) relays and are internal to the block.				

X50A Fuse Block – Under-hood Label Usage				
No.	**Device Label Name**	**Device Assigned Name**	**Rating**	**Description**
—	—	KR3 Horn Relay	—	F47UA, P12 Horn
—	—	KR11 Windshield Washer Pump Relay	—	F53UA, G24 Windshield Washer Pump
—	—	KR12B Windshield Wiper Relay	—	KR12C Windshield Wiper Speed Control Relay
—	—	KR12C Windshield Wiper Speed Control Relay	—	M75 Windshield Wiper Motor
—	—	KR46 Front Fog Lamp Relay	—	E29LF Fog Lamp-Left Front, E29RF Fog Lamp- Right Front, F48UA
—	—	KR48 Headlamp High Beam Relay	—	F57UA, E4E Headlamp- Left High Beam (X88), E4F Headlamp-Right High Beam (X88), M28L High Beam Solenoid Actuator-Left (Z88) M28R High Beam Solenoid Actuator-Right (Z88)
—	—	KR59 Stop Lamp Relay	—	F37UA, E6 Center High Mounted Stop Lamp
—	—	KR61 Trailer Backup Lamp Relay	—	A10 Inside Rearview Mirror, B87 Rearview Camera, E5E Tail lamp-Left, E5F Tail lamp-Right, F15UA, F32UA, X88 Trailer Connector
—	—	KR63L Trailer Stop/Turn Signal Lamp Relay-Left	—	F13UA, X88 Trailer Connector
—	—	KR63R Trailer Stop/Turn Signal Lamp Relay-Right	—	F16UA, X88 Trailer Connector

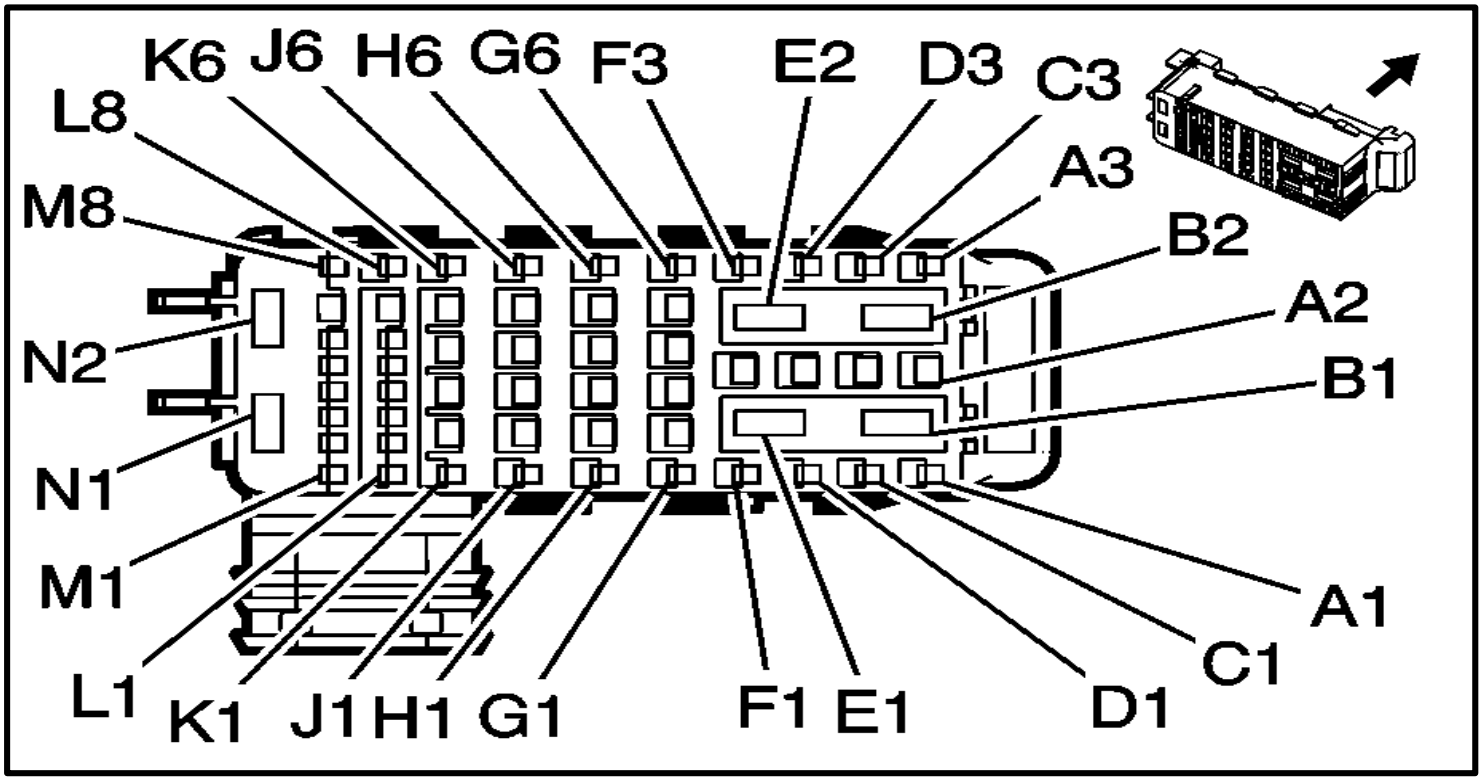
Fuse Block (X50A) Under-hood - Connector X1



Fuse Block (X50A) Under-hood - Connector X1 (continued)

Pin	Size	Color	Circuit	Function
A	-	-	-	Not Occupied
B2	4	RD/GY	642	Battery Positive Voltage
C	-	-	-	Not Occupied
D1	0.75	YE	712	Left Headlamp Low Beam Supply Voltage
D3	0.75	L-GN/VT	1315	Right Front Turn Signal Lamp Supply Voltage
E2	4	RD/WH	342	Battery Positive Voltage
F1	0.5	GY/BN	309	Right Park Lamp Supply Voltage
F2	0.75	GY/VT	228	Windshield Washer Pump Control
F3	0.75	D-BU/WH	1314	Left Front Turn Signal Lamp Supply Voltage
G1	0.5	VT/GY	709	Left Park Lamp Supply Voltage
G4	0.5	BK	150	Ground
H2	0.75	GY/D-BU	7538	Left Front DRL Supply Voltage
H4	0.5	WH	311	Right Headlamp High Beam Supply Voltage
H6	0.75	D-BU/BN	7539	Right Front DRL Supply Voltage
J2	0.75	BN/GY	29	Horn Control
J3	0.5	BN/VT	2234	Front Fog Lamp Supply Voltage
J4	0.5	WH	711	Left Headlamp High Beam Supply Voltage
J5	0.75	YE	312	Right Headlamp Low Beam Supply Voltage
K-	-	-	-	Not Occupied

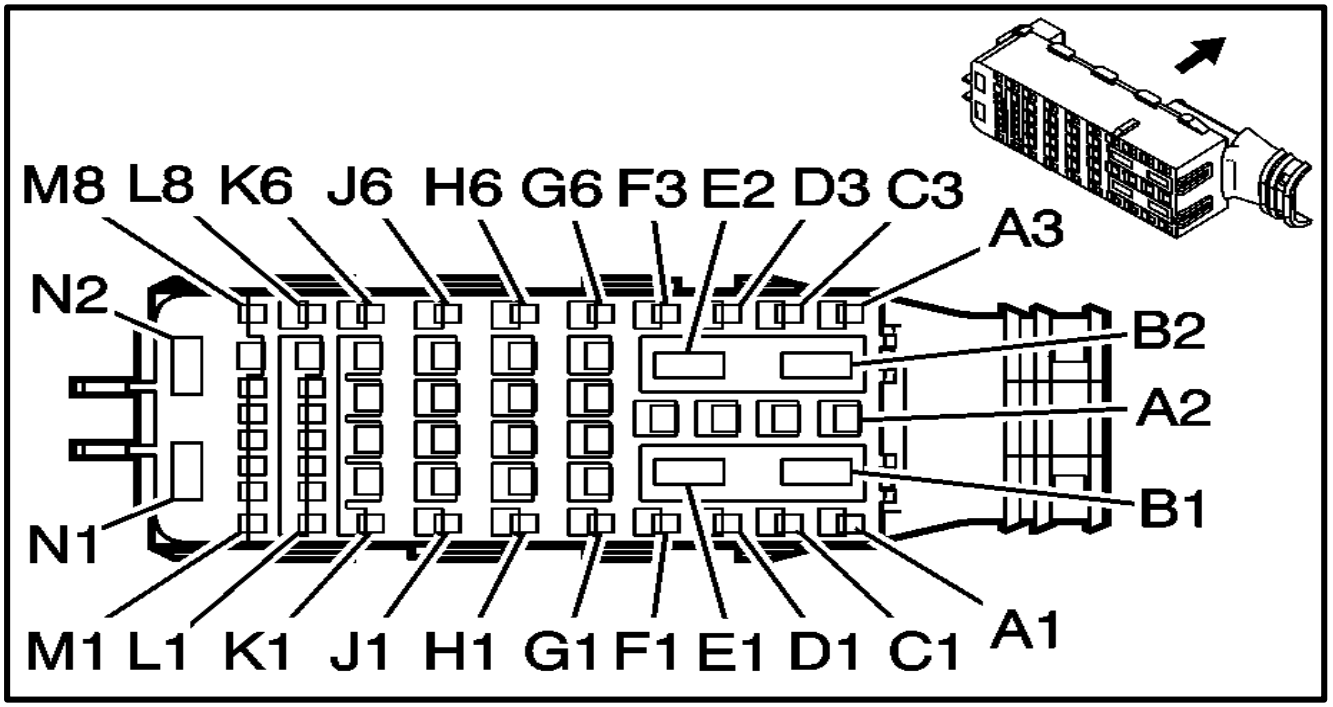
Fuse Block (X50A) Under-hood - Connector X2



Pin	Size	Color	Circuit	Function
A1	0.5	WH/GY	459	A/C Compressor Clutch Relay Control
B	-	-	-	Not Occupied
C1	0.75	BN/L-GN	59	A/C Compressor Clutch Supply Voltage
D3	0.5	YE/BK	625	Starter Enable Relay Control
E2	4	YE	6	Starter Solenoid Crank Voltage
F2	2.5	BK	550	Ground

Pin	Size	Color	Circuit	Function
G3	0.5	VT/D-BU	5293	Powertrain Main Relay Fused Supply (4)
G4	2.5	VT/D-BU	5290	Powertrain Main Relay Fused Supply (1)
G5	0.75	RD/L-GN	1840	Battery Positive Voltage
H2	0.75	VT/D-BU	5291	Powertrain Main Relay Fused Supply (2)
H3	0.75	VT/D-BU	5293	Powertrain Main Relay Fused Supply (4)
H5	0.5	RD/BN	440	Battery Positive Voltage
H6	0.5	YE	5991	Powertrain Relay Coil Control
J2	0.5	VT/D-BU	5294	Powertrain Main Relay Fused Supply (5)
J3	0.75	VT/D-BU	5291	Powertrain Main Relay Fused Supply (2)
J4	0.75	VT/D-BU	5292	Powertrain Main Relay Fused Supply (3)
J5	0.5	VT/D-BU	5294	Powertrain Main Relay Fused Supply (5)
K3	0.5	VT/D-BU	5291	Powertrain Main Relay Fused Supply (2)
K4	0.75	VT/D-BU	5292	Powertrain Main Relay Fused Supply (3)
K5	0.5	VT/D-BU	5292	Powertrain Main Relay Fused Supply (3)
L7	0.5	VT/BK	2139	Run/Crank Ignition 1 Voltage
M5	0.5	GY	5660	Fuel Pump Controller Data Out Signal
M6	0.75	BK/WH	451	Signal Ground
M7	0.5	VT/L-GN	439	Run/Crank Ignition 1 Voltage
N-	-	-	-	Not Occupied

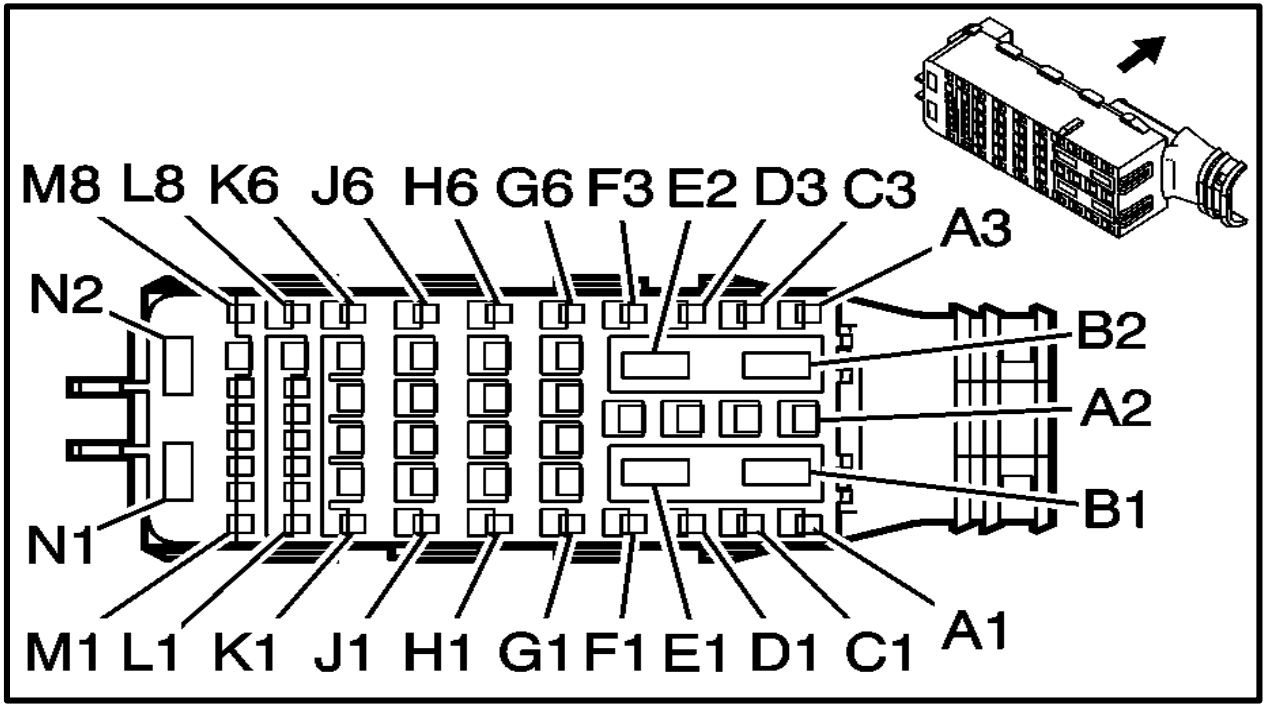
Fuse Block (X50A) Under-hood - Connector X3



Pin	Size	Color	Circuit	Function
A1	0.5	YE/D-BU	18	Left Rear Stop/Turn Lamp Supply Voltage
B1	4	RD/GY	1342	Battery Positive Voltage
C1	0.5	BN/L-GN	19	Right Rear Stop/Turn Lamp Supply Voltage
D1	0.75	L-GN/VT	1315	Right Front Turn Signal Lamp Supply Voltage
E	-	-	-	Not Occupied
F1	0.75	D-BU/WH	1314	Left Front Turn Signal Lamp Supply Voltage
F3	0.5	D-BU/L-GN	962	

Pin	Size	Color	Circuit	Function
G1	0.75	D-BU/BN	7539	Right Front DRL Supply Voltage
H2	1	BK	550	Ground
J1	0.35	WH/VT	860	Front Windshield Wiper Switch High Signal
K1	0.5	VT/WH	5065	Stop Lamp Relay Coil Supply Voltage
K3	1	YE/BN	95	Windshield Wiper Motor Low Speed Control
K4	1	WH	92	Windshield Wiper Motor High Speed Control
K6	0.35	BN/GY	2268	Windshield Washer Relay Control
L2	0.35	BN/VT	1969	Headlamp High Beam Relay Control
L4	0.35	GY	91	Windshield Wiper Motor Relay Coil Supply Voltage
L5	0.5	BN/WH	1317	Fog Lamp Relay Control
L6	0.35	BN/WH	28	Horn Relay Control
L7	0.5	BN/YE	2267	Mirror Heating Element Supply Voltage
M1	0.75	YE	312	Right Headlamp Low Beam Supply Voltage
M5	0.5	D-BU/L-GN	961	
M6	0.5	VT/GY	1054	Stop Lamp Supply Voltage
M7	2.5	RD/L-GN	965	
N-	-	-	-	Not Occupied

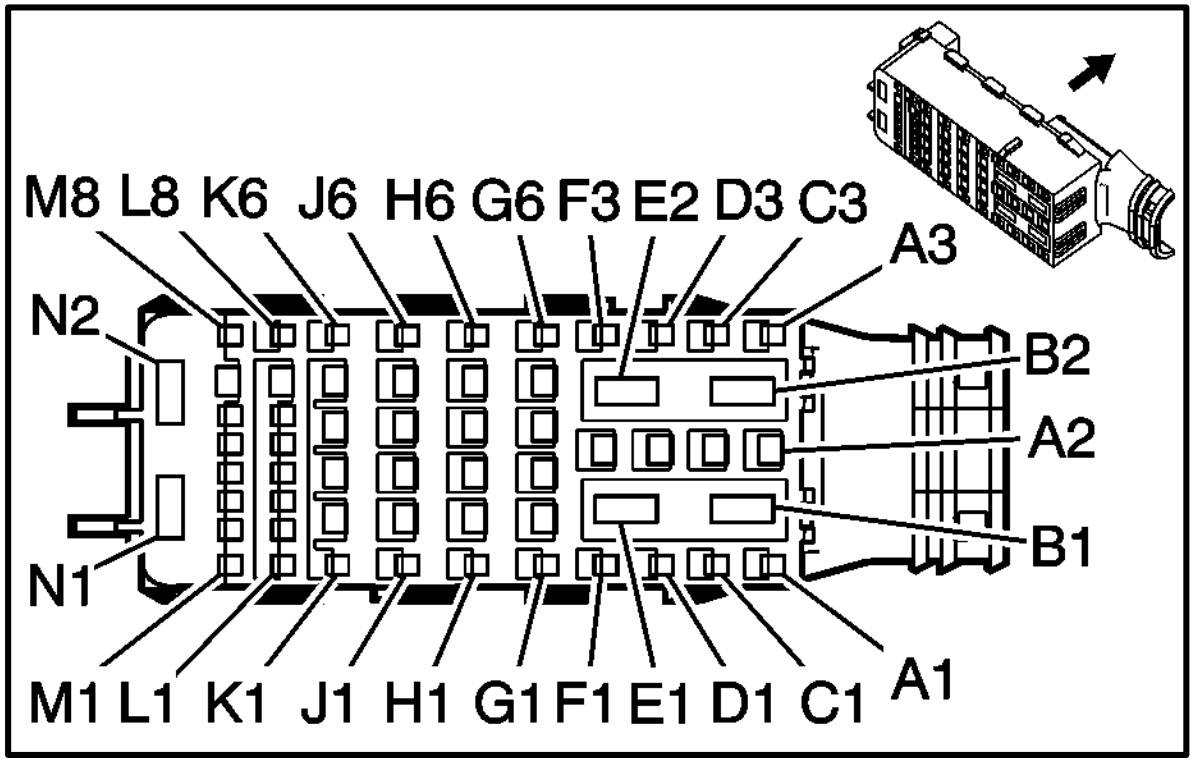
Fuse Block (X50A) Under-hood - Connector X4



Pin	Size	Color	Circuit	Function
A3	0.5	L-GN/WH	24	Backup Lamp Supply Voltage
B2	5	RD/VT	842	Battery Positive Voltage
C	-	-	-	Not Occupied
D3	0.5	VT/L-GN	1739	Run/Crank Ignition 1 Voltage
E2	5	RD/D-BU	42	Battery Positive Voltage
F3	0.35	L-GN/WH	24	Backup Lamp Supply Voltage
G2	2.5	RD/L-GN	966	

Pin	Size	Color	Circuit	Function
H5	2.5	RD/L-GN	242	Battery Positive Voltage
J6	0.75	BK/WH	451	Signal Ground
J1	0.75	GY/D-BU	7538	Left Front DRL Supply Voltage
K1	0.75	YE	712	Left Headlamp Low Beam Supply Voltage
K2	2.5	RD/L-GN	968	
K5	2.5	RD/L-GN	967	
K6	0.5	VT/GY	709	Left Park Lamp Supply Voltage
L1	0.5	D-BU/L-GN	964	
L2	0.35	YE/GY	5187	Right Trailer Turn Signal Lamp
L3	0.35	D-BU/BN	38	Backup Lamp Relay Control
L4	0.35	D-BU/WH	5186	Left Trailer Turn Signal Lamp
L5	0.35	D-BU	45	Park Lamp Relay Control
L6	0.5	D-BU/L-GN	963	
M1	0.75	RD/YE	2340	Battery Positive Voltage
M2	0.35	BN/VT	193	Rear Defog Relay Control
M5	0.35	L-GN/VT	5199	Run/Crank Relay Coil Control
N1	2.5	BN/VT	293	Rear Defog Element Supply Voltage

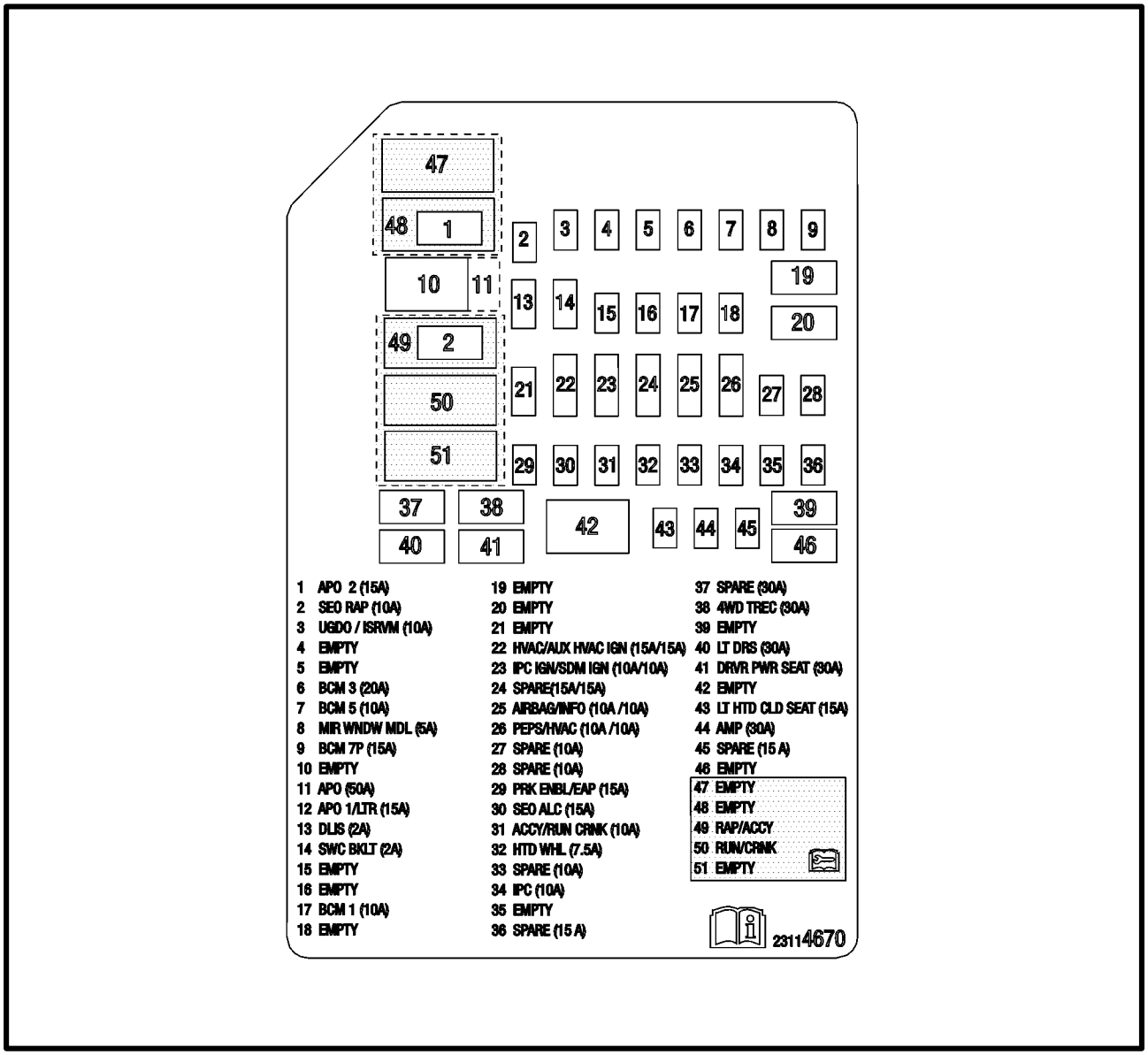
Fuse Block (X50A) Under-hood - Connector X5



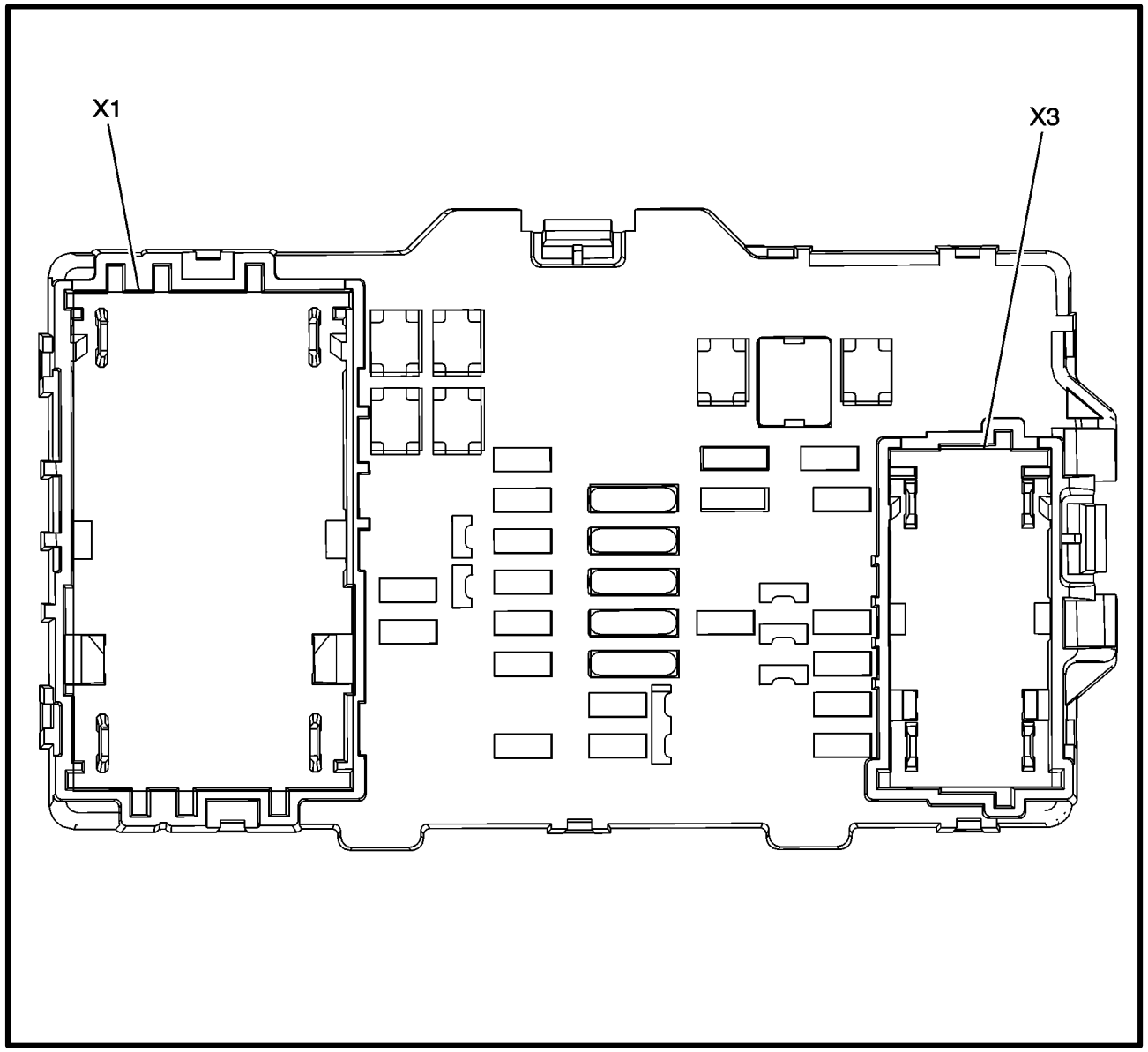
Pin	Size	Color	Circuit	Function
A2	0.75	YE/D-BU	18	Left Rear Stop/Turn Lamp Supply Voltage
A3	0.75	BN/L-GN	19	Right Rear Stop/Turn Lamp Supply Voltage
B1	5	RD/YE	442	Battery Positive Voltage
C1	0.75	L-GN/WH	24	Backup Lamp Supply Voltage
D1	0.5	VT/L-GN	1739	Run/Crank Ignition 1 Voltage
E	-	-	-	Not Occupied

Pin	Size	Color	Circuit	Function
F1	0.5	L-GN/WH	24	Backup Lamp Supply Voltage
F3	0.5	GY	3890	Aero Shutter Control 2
G2	2.5	RD/VT	1940	Battery Positive Voltage
G4	0.75	RD/WH	2040	Battery Positive Voltage
H3	0.5	RD/L-GN	1840	Battery Positive Voltage
H6	0.5	BN	3891	Aero Shutter Control
J2	2.5	RD/L-GN	242	Battery Positive Voltage
J3	1.5	GY/BN	2109	Trailer Park Lamp Supply Voltage
J4	2.5	RD/VT	1640	Battery Positive Voltage
J5	0.5 0.75	VT/L-GN PU/L-GN	439 439	Run/Crank Ignition 1 Voltage Run/Crank Ignition 1 Voltage
K2	0.75	VT/GY	709	Left Park Lamp Supply Voltage
K4	0.75	GY/BN	309	Right Park Lamp Supply Voltage
K5	0.75	YE/GY	1618	Left Rear Trailer Stop/Turn Lamp Supply Voltage
K6	0.75	L-GN/VT	1619	Right Rear Trailer Stop/Turn Lamp Supply Voltage
L	-	-	-	Not Occupied
M1	0.5	VT/GY	1054	Stop Lamp Supply Voltage
M5	0.5	GY	5660	Fuel Pump Controller Data Out Signal
M7	0.5	VT/D-BU	5294	Powertrain Main Relay Fused Supply (5)
M8	0.75	WH/L-GN	1624	Trailer Backup Lamp Supply Voltage
N2	4	RD/L-GN	742	Battery Positive Voltage

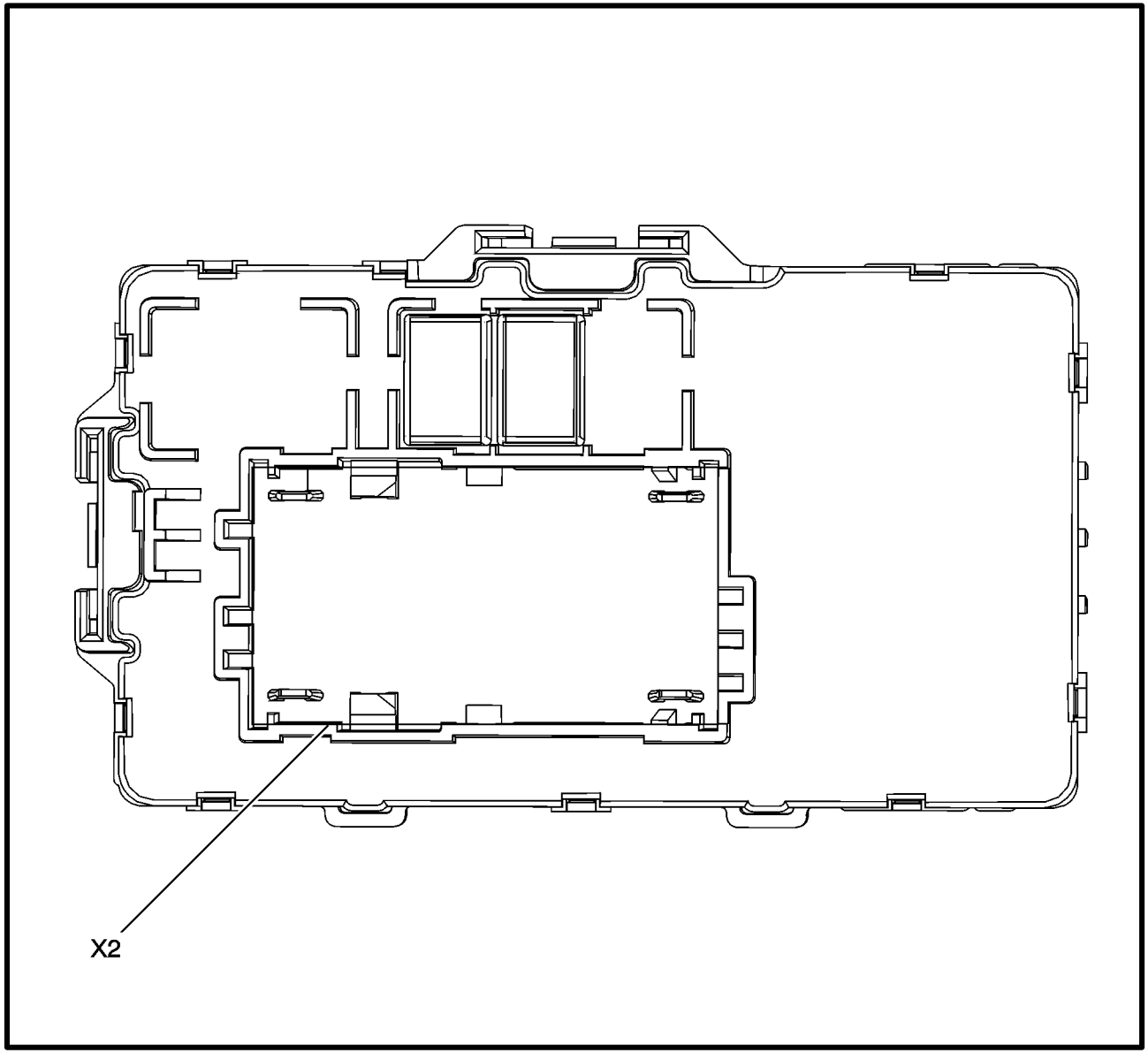
Fuse Block (X51L) Instrument Panel Left - Label



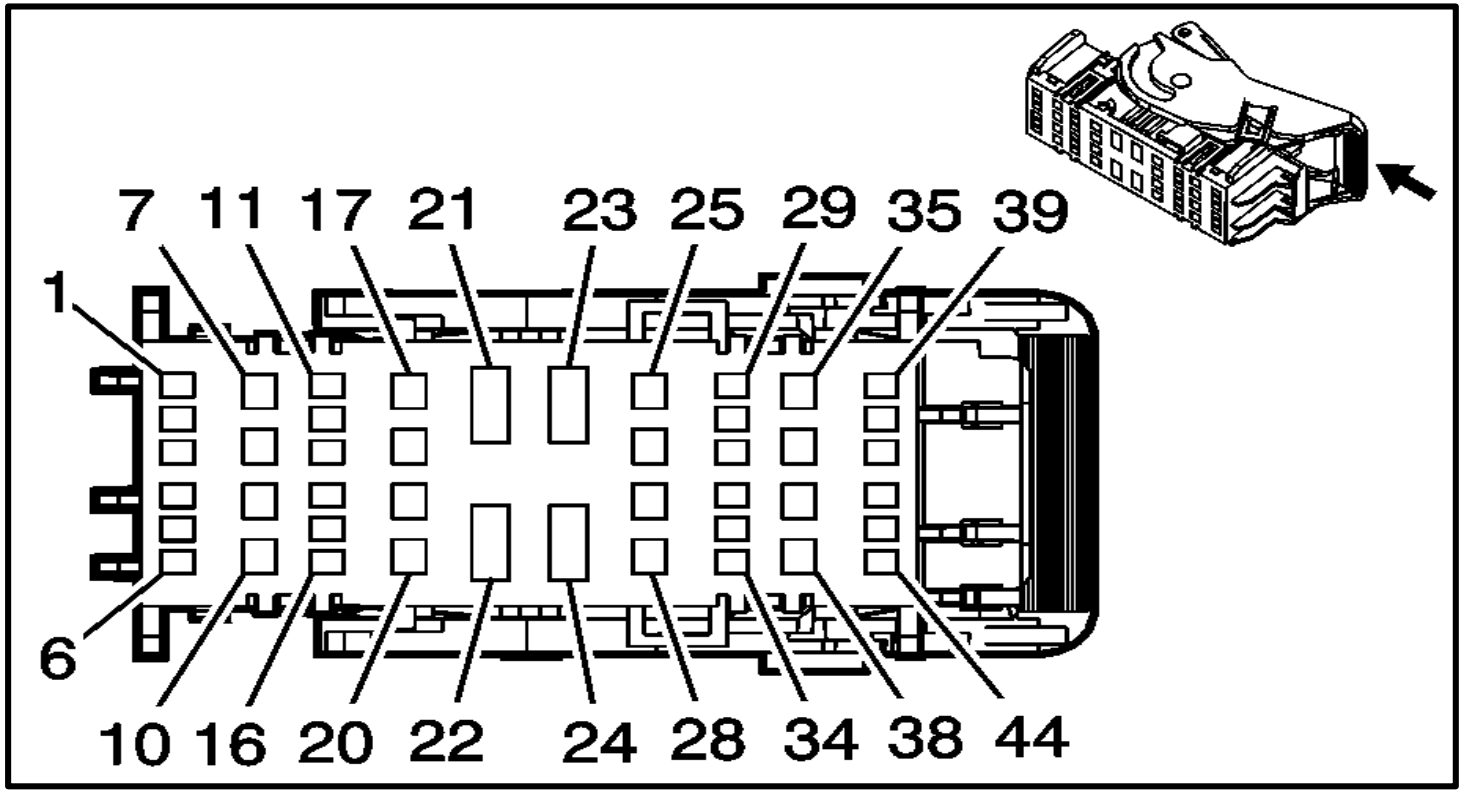
Fuse Block (X51L) Instrument Panel Left - Top View



Fuse Block (X51L) Instrument Panel Left - Bottom View



Fuse Block (X51L) Instrument Panel Left – Connector X1



Fuse Block (X51L) Instrument Panel Left – Connector X1 Pin-out

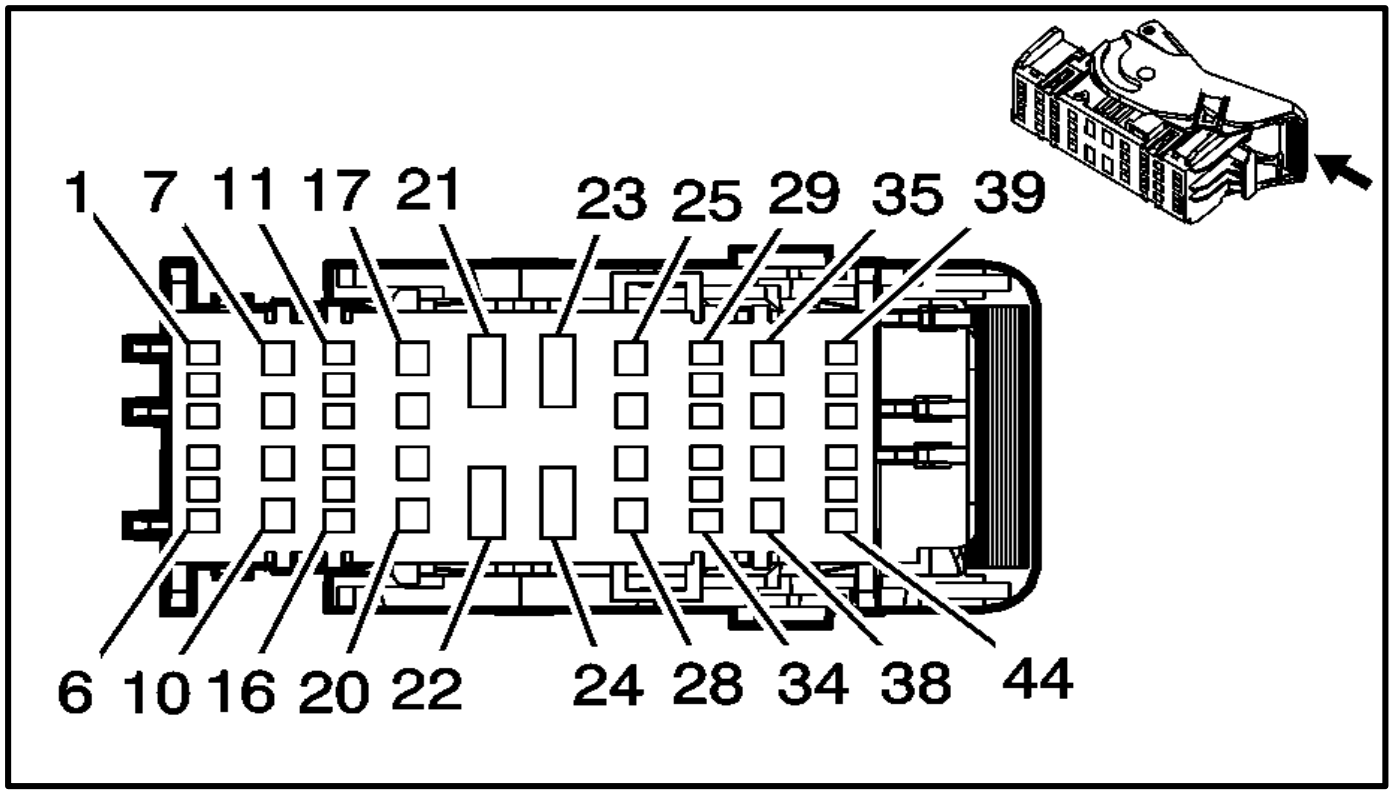
X51L Fuse Block - Instrument Panel Left X1

Pin	Size	Color	Circuit	Function
1-3	-	-	-	Not Occupied
4	0.75	RD/L-GN	5140	Battery Positive Voltage
5	0.5 0.35	RD/L-GN RD/L-GN	4440 4440	Battery Positive Voltage Battery Positive Voltage
6-14	-	-	-	Not Occupied
15	0.35	L-GN/GY	5286	Adjustable Pedal Switch Forward Signal
16	0.35	RD/VT	1940	Battery Positive Voltage
17	2.5	RD/YE	3740	Battery Positive Voltage
18	0.75	RD/L-GN	5140	Battery Positive Voltage
19	-	-	-	Not Occupied
20	0.75	L-GN/VT	5130	Adjustable Pedal Actuator Forward Control
21	5	RD/VT	842	Battery Positive Voltage
22	-	-	-	Not Occupied
23	5	RD/D-BU	42	Battery Positive Voltage
24-26	-	-	-	Not Occupied
27	2.5	RD/YE	5040	Battery Positive Voltage
28	0.75	YE	5129	Adjustable Pedal Actuator Rearward Control
29	-	-	-	Not Occupied
30	0.5	VT/WH	1939	Run/Crank Ignition 1 Voltage
31	-	-	-	Not Occupied
32	0.5	VT/L-GN	1739	Run/Crank Ignition 1 Voltage
33	0.35	WH/GY	5285	Adjustable Pedal Switch Rearward Signal

X51L Fuse Block - Instrument Panel Left X1

Pin	Size	Color	Circuit	Function
34-35	-	-	-	Not Occupied
36	2.5	RD/D-BU	1842	Battery Positive Voltage
37	2.5	RD/D-BU	1842	Battery Positive Voltage
38-41	-	-	-	Not Occupied
42	0.35	L-GN/VT	5199	Run/Crank Relay Coil Control
43	0.35	GY/VT	755	RAP Relay Coil Control
44	0.35	VT/YE	43	Accessory Voltage

Fuse Block (X51L) Instrument Panel Left – Connector X2

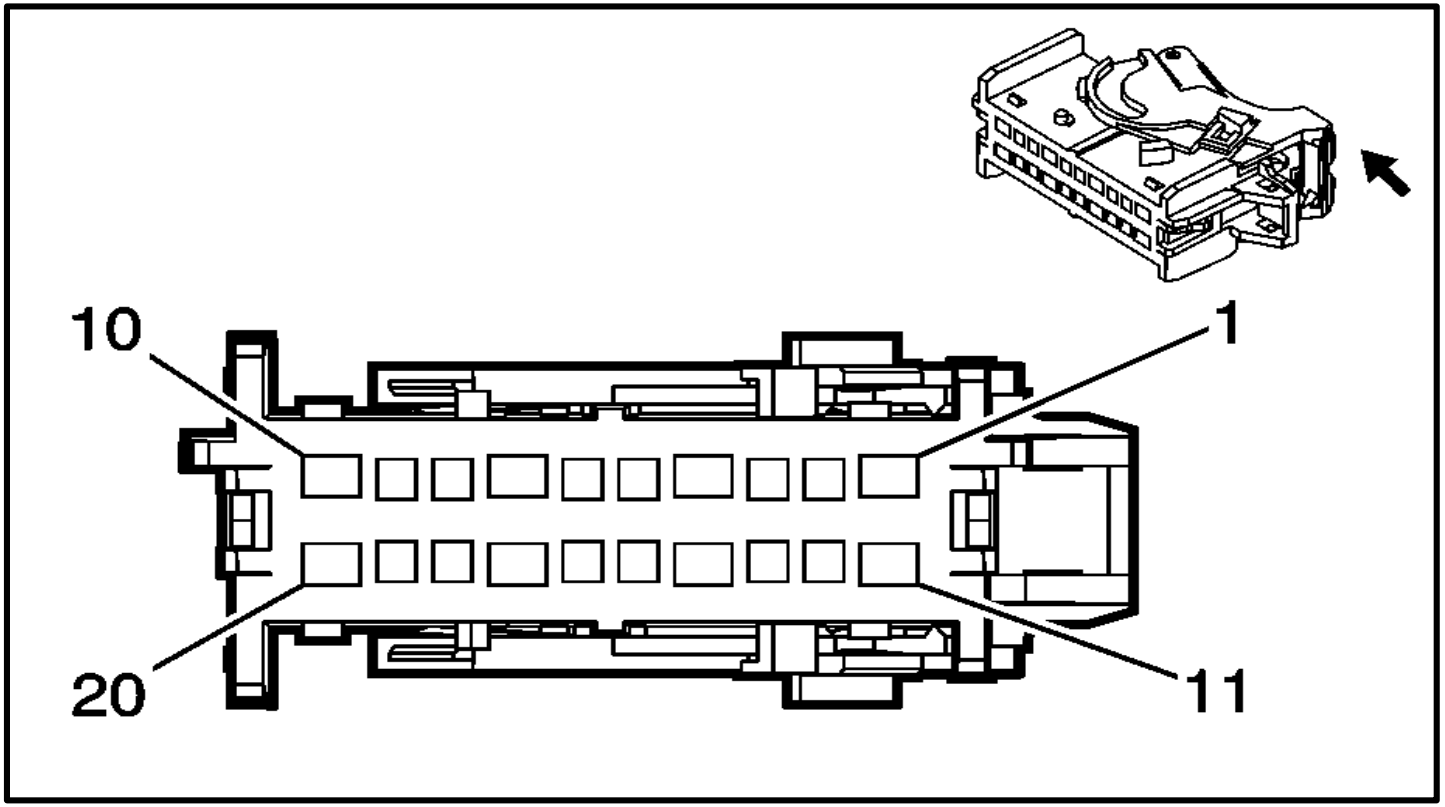


Fuse Block (X51L) Instrument Panel Left – Connector X2 Pin-out

X51L Fuse Block - Instrument Panel Left X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
1-2	-	-	-	Not Occupied
3	0.5	YE	6817	LED Backlight Dimming Control
4	0.35	BN	6136	Supply Voltage
5	0.5	RD/D-BU	540	Battery Positive Voltage
6	-	-	-	Not Occupied
7	0.5	RD/BN	2940	Battery Positive Voltage
8	1	RD/GY	2140	Battery Positive Voltage
9	-	-	-	Not Occupied
10	1.5	RD/BN	4240	Battery Positive Voltage
11-14	-	-	-	Not Occupied
15	0.5	VT/GY	539	Run/Crank Ignition 1 Voltage
16-17	-	-	-	Not Occupied
18	0.5	RD/WH	2740	Battery Positive Voltage
19	-	-	-	Not Occupied
20	1.5	RD/WH	1040	Battery Positive Voltage
21-24	-	-	-	Not Occupied
25	0.5	RD/VT	3340	Battery Positive Voltage
26	0.35	RD/D-BU	3240	Battery Positive Voltage
27	-	-	-	Not Occupied
28	0.5	VT/BK	1639	Run/Crank Ignition 1 Voltage
29-34	-	-	-	Not Occupied

X51L Fuse Block - Instrument Panel Left X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
35	0.5	RD/GY	2840	Battery Positive Voltage
36	-	-	-	Not Occupied
37	0.5	VT/WH	1139	Run/Crank Ignition 1 Voltage
38	0.35	VT/L-GN	1739	Run/Crank Ignition 1 Voltage
39-42	-	-	-	Not Occupied
43	0.35	YE	6812	Out of Park Signal
44	0.75	BK	1850	Ground

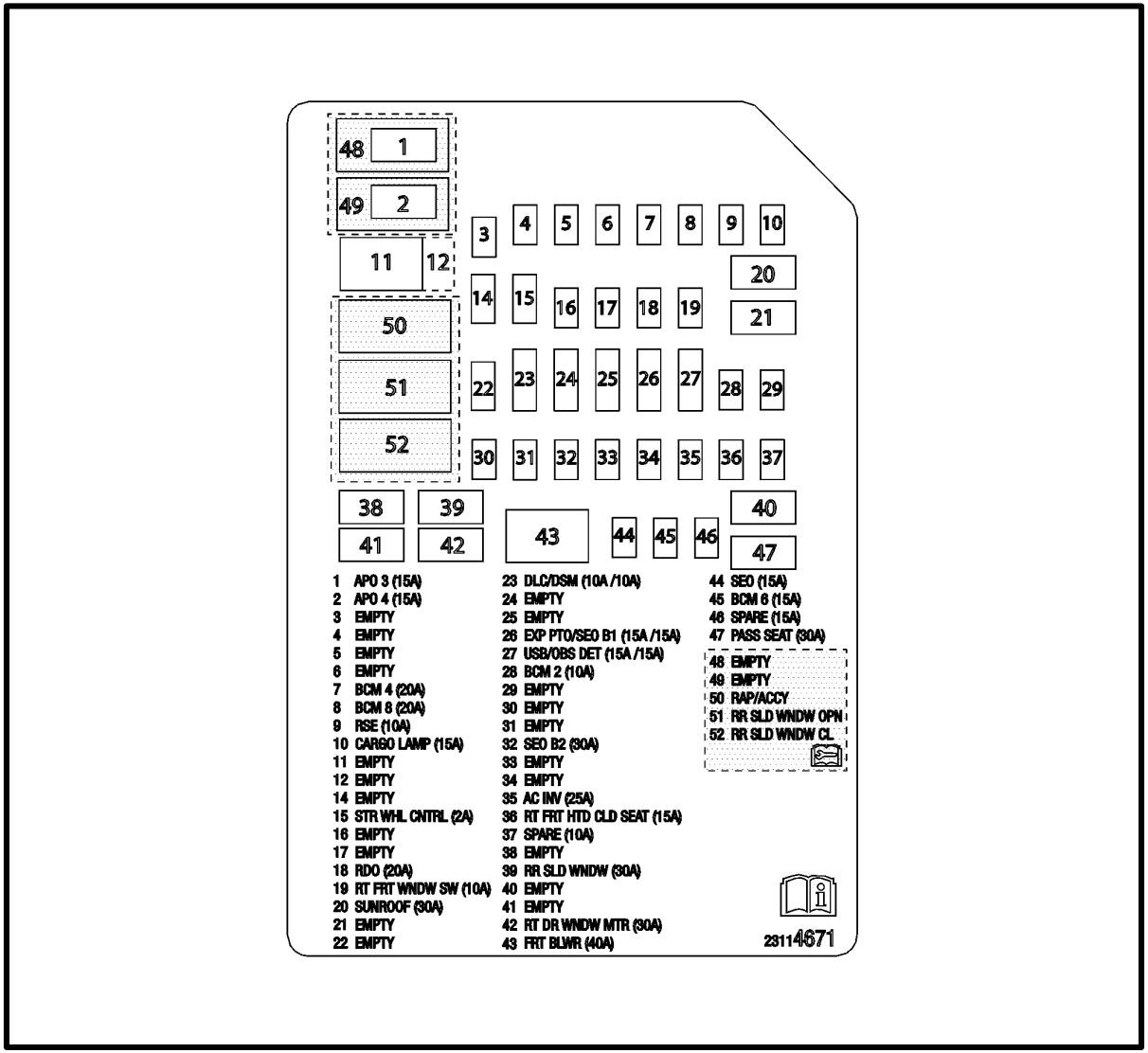
Fuse Block (X51L) Instrument Panel Left – Connector X3



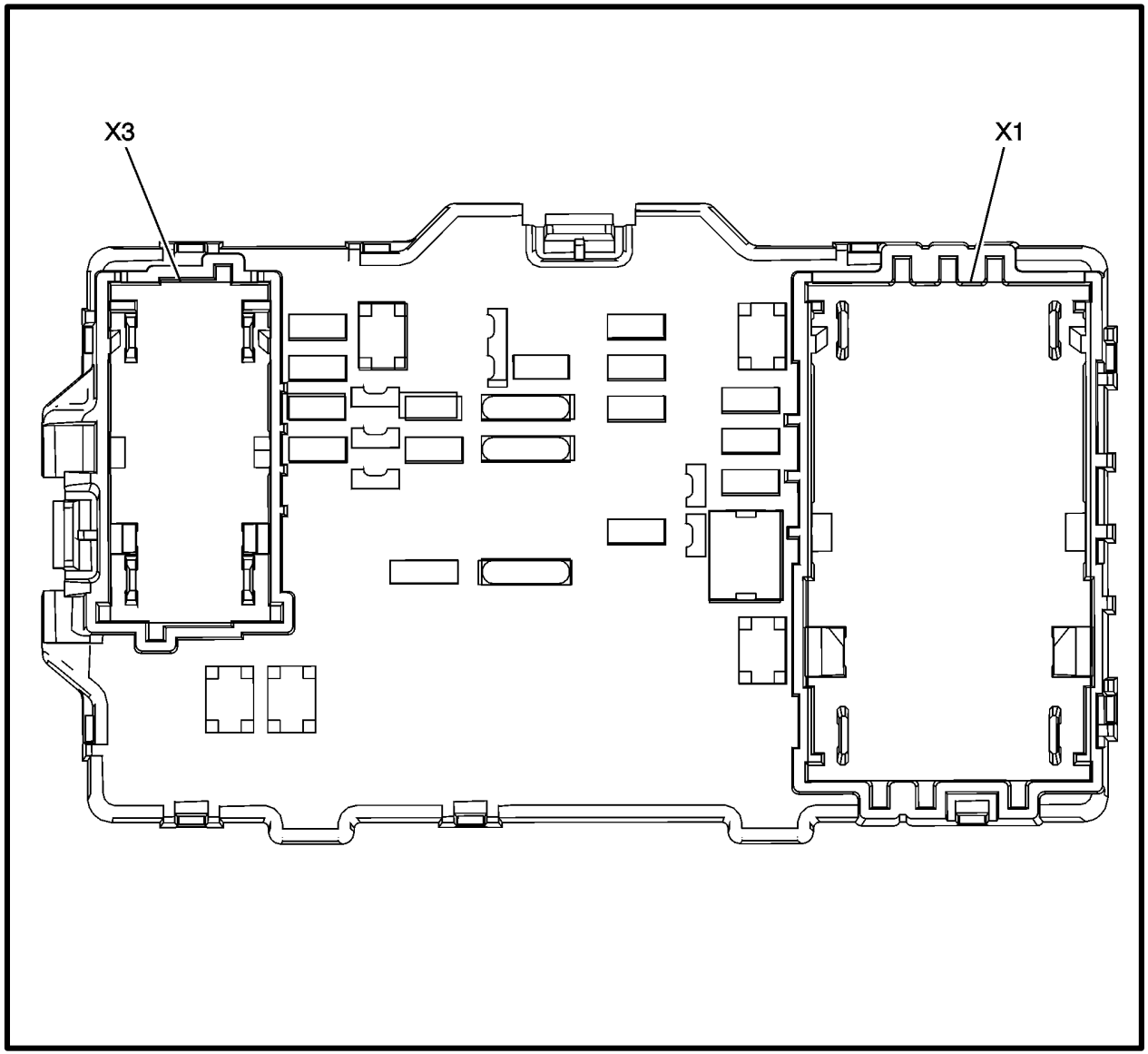
Fuse Block (X51L) Instrument Panel – Connector X3 Pin-out

X51L Fuse Block - Instrument Panel Left X3				
Pin	**Size**	**Color**	**Circuit**	**Function**
1-10	-	-	-	Not Occupied
11	0.35	VT/YE	43	Accessory Voltage
12	0.5	RD/YE	240	Battery Positive Voltage
13	0.35	VT/L-GN	1739	Run/Crank Ignition 1 Voltage
14	0.35	VT/WH	1139	Run/Crank Ignition 1 Voltage

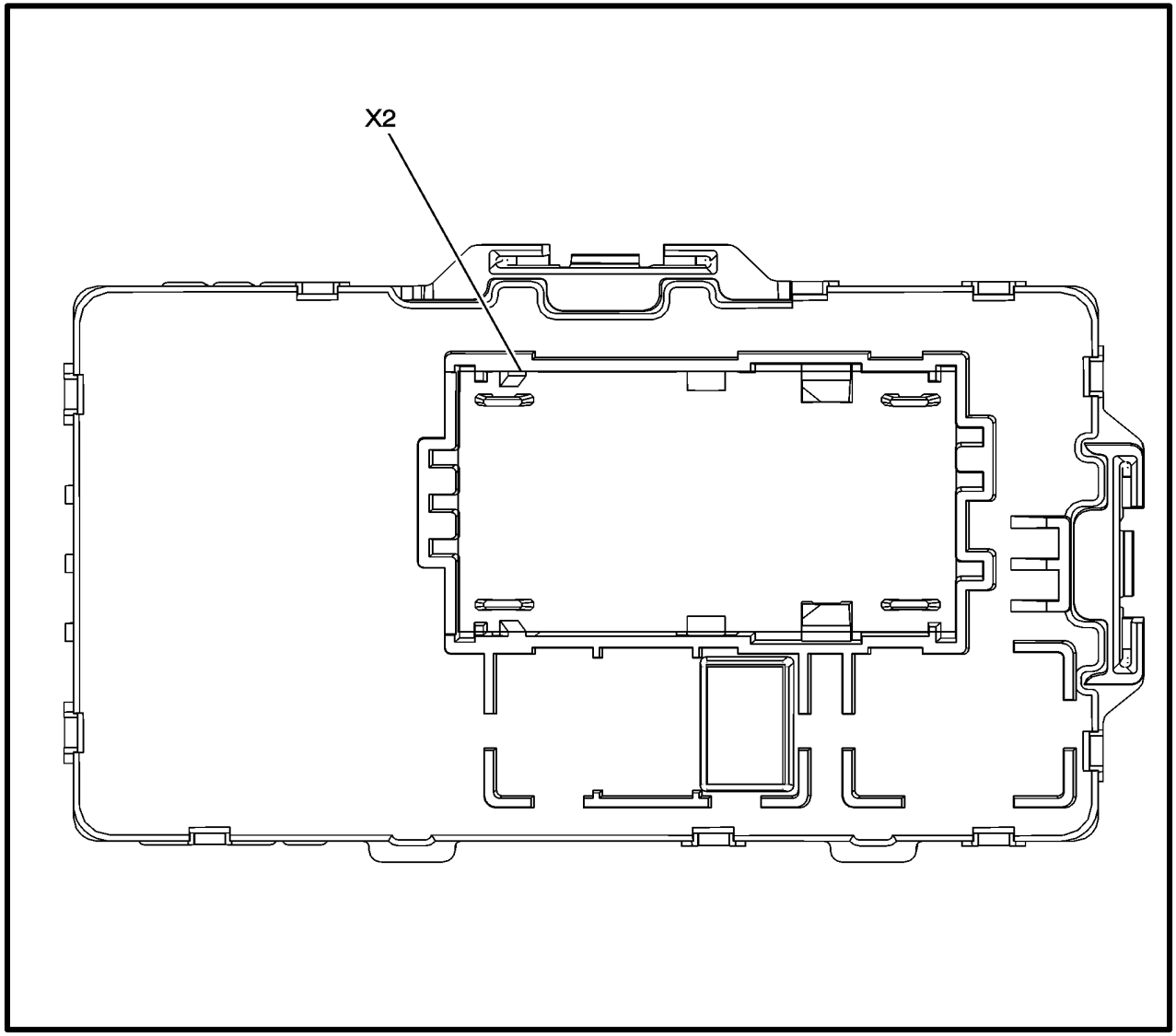
Fuse Block (X51R) Instrument Panel Right - Label



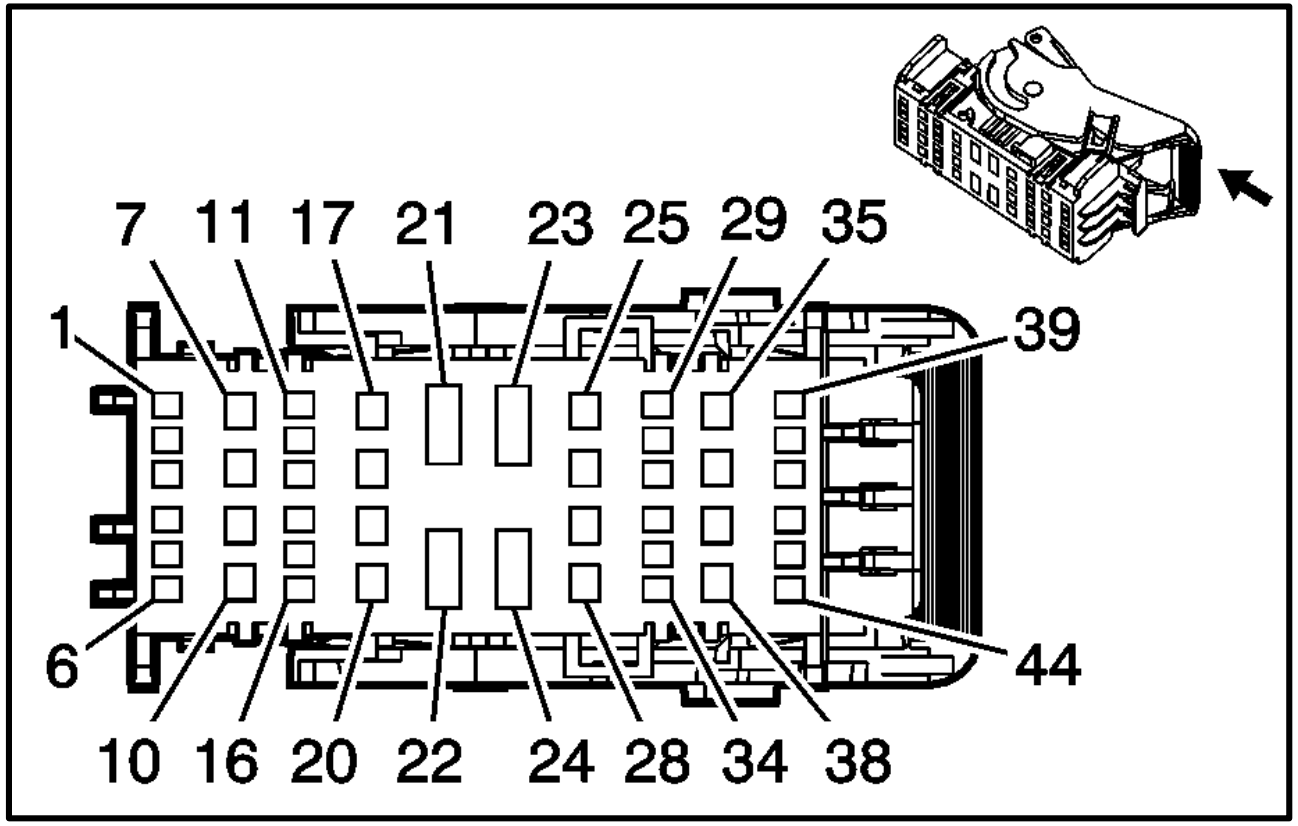
Fuse Block (X51R) Instrument Panel Right - Top View



Fuse Block (X51R) Instrument Panel – Bottom View



Fuse Block (X51R) Instrument Panel - Connector X1

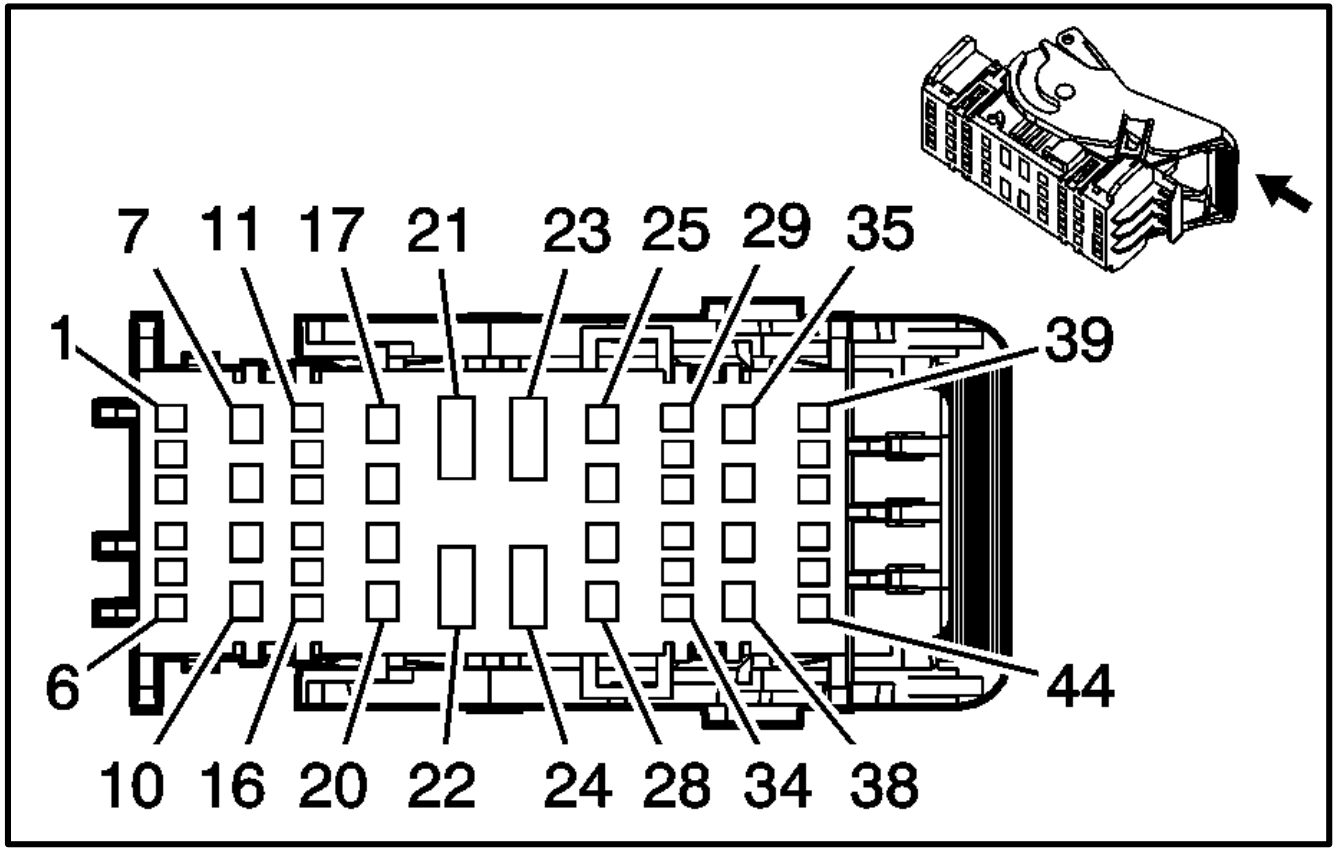


Fuse Block (X51R) Instrument Panel - Connector X1 Pin-outs

X51R Fuse Block - Instrument Panel Right X1				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	0.75 1.5	GY GY	295 295	Door Lock Actuator Lock Control Door Lock Actuator Lock Control
2	1.5	WH/D-BU	3266	Child Security Lock Motor Unlock Control
3	0.35	VT/YE	3267	Child Security Lock Relay Control
4	1.5	GY/L-GN	3271	Door Lock Control (2)
5	-	-	-	Not Occupied
6	0.35	GY/VT	755	RAP Relay Coil Control
7-8	-	-	-	Not Occupied
9	2.5	GY/L-GN	5441	Endgate Window Regulator Down Signal
10	2.5	YE/D-BU	5442	Endgate Window Regulator Up Signal
11	-	-	-	Not Occupied
12	0.75	RD/D-BU	4540	Battery Positive Voltage
13	0.75	RD/VT	2640	Battery Positive Voltage
14	-	-	-	Not Occupied
15	0.5	VT/GY	709	Left Park Lamp Supply Voltage
16	0.5	RD/BN	1140	Battery Positive Voltage
17	-	-	-	Not Occupied
18	1.5	RD/D-BU	840	Battery Positive Voltage
19	2.5	RD/WH	1340	Battery Positive Voltage
20	2.5	RD/WH	1340	Battery Positive Voltage
21	6	RD/L-GN	242	Battery Positive Voltage
22	4	RD/VT	542	Battery Positive Voltage

X51R Fuse Block - Instrument Panel Right X1				
Pin	**Size**	**Color**	**Circuit**	**Function**
23	-	-	-	Not Occupied
24	6	RD/GY	142	Battery Positive Voltage
25-26	-	-	-	Not Occupied
27	0.75	RD/VT	340	Battery Positive Voltage
28	-	-	-	Not Occupied
29	1.5	D-BU/WH	195	Door Lock Control
30-32	-	-	-	Not Occupied
33	0.75	RD/WH	3440	Battery Positive Voltage
34-36	-	-	-	Not Occupied
37	0.75	RD/L-GN	6140	Battery Positive Voltage
38	2.5	RD/BN	1440	Battery Positive Voltage
39	-	-	-	Not Occupied
40	0.75	GY	5911	Door Lock Actuator Lock Control 2
41-42	-	-	-	Not Occupied
43	0.75	RD/L-GN	3140	Battery Positive Voltage
44	-	-	-	Not Occupied

Fuse Block (X51R) Instrument Panel - Connector X2

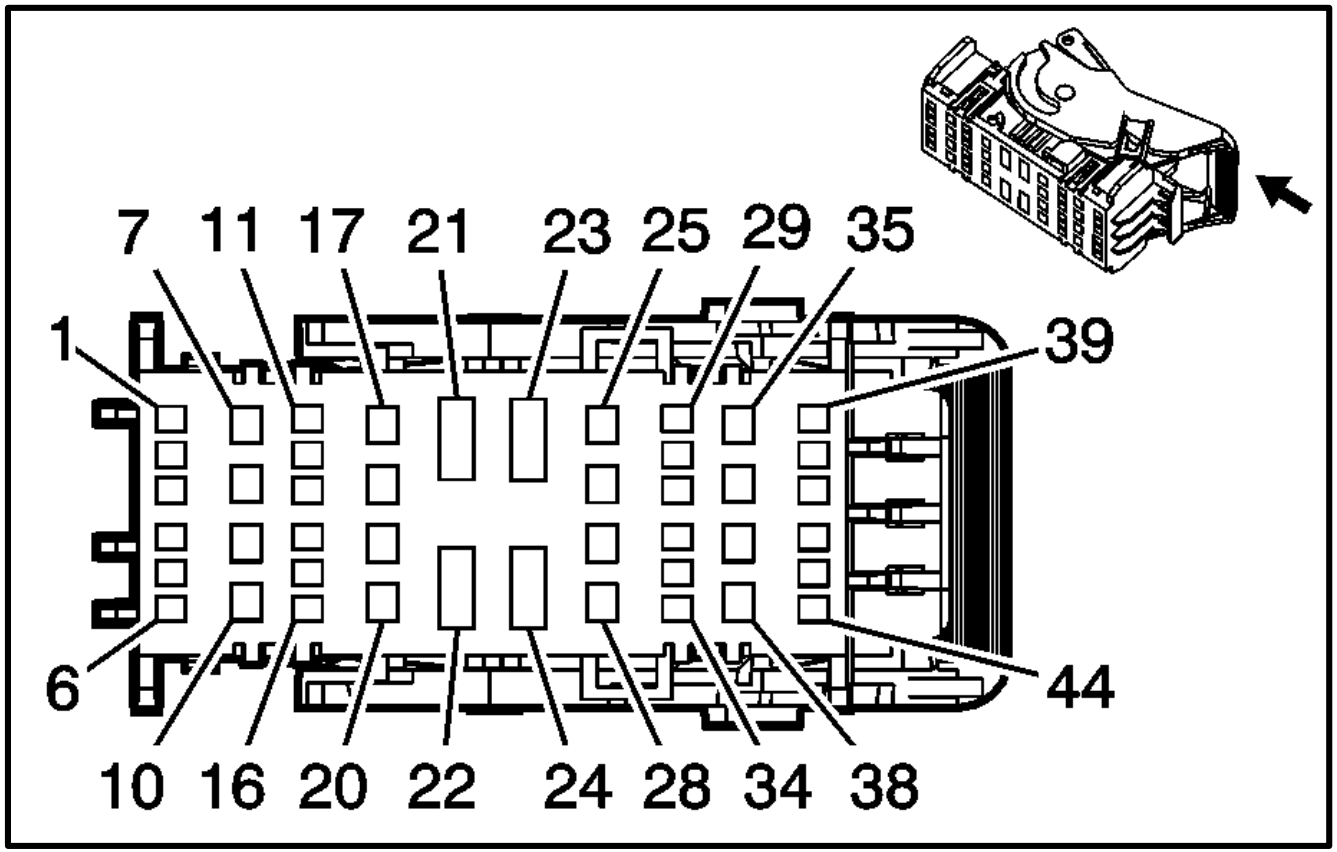


Fuse Block (X51R) Instrument Panel - Connector X2 Pin-outs

X51R Fuse Block - Instrument Panel Right X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	0.5	RD/L-GN	1540	Battery Positive Voltage
2-3	-	-	-	Not Occupied
4	0.5	BN/WH	1429	Standing Lamp Relay Control
5	0.5	BK	1050	Ground
6	-	-	-	Not Occupied
7	0.75	RD/VT	4040	Battery Positive Voltage
8	0.75	RD/D-BU	2540	Battery Positive Voltage
9	-	-	-	Not Occupied
10	1.5	RD/D-BU	840	Battery Positive Voltage
11	0.75	WH/VT	1430	Exterior Courtesy Lamp Supply Voltage
12-15	-	-	-	Not Occupied
16	0.35	RD/YE	3040	Battery Positive Voltage
17	1 0.75	RD/VT RD/VT	340 340	Battery Positive Voltage Battery Positive Voltage
18-21	-	-	-	Not Occupied
22	2.5	BK	1050	Ground
23-28	-	-	-	Not Occupied
29	0.5	RD/BN	2240	Battery Positive Voltage
30-31	-	-	-	Not Occupied
32	0.35	YE/VT	6191	Power Sliding Window Switch Open Signal
33	0.35	WH	6192	Power Sliding Window Switch Close Signal
34	0.5	RD/WH	640	Battery Positive Voltage

X51R Fuse Block - Instrument Panel Right X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
35	2.5	RD/GY	4140	Battery Positive Voltage
36-37	-	-	-	Not Occupied
38	1.5	RD/YE	2340	Battery Positive Voltage
39-44	-	-	-	Not Occupied

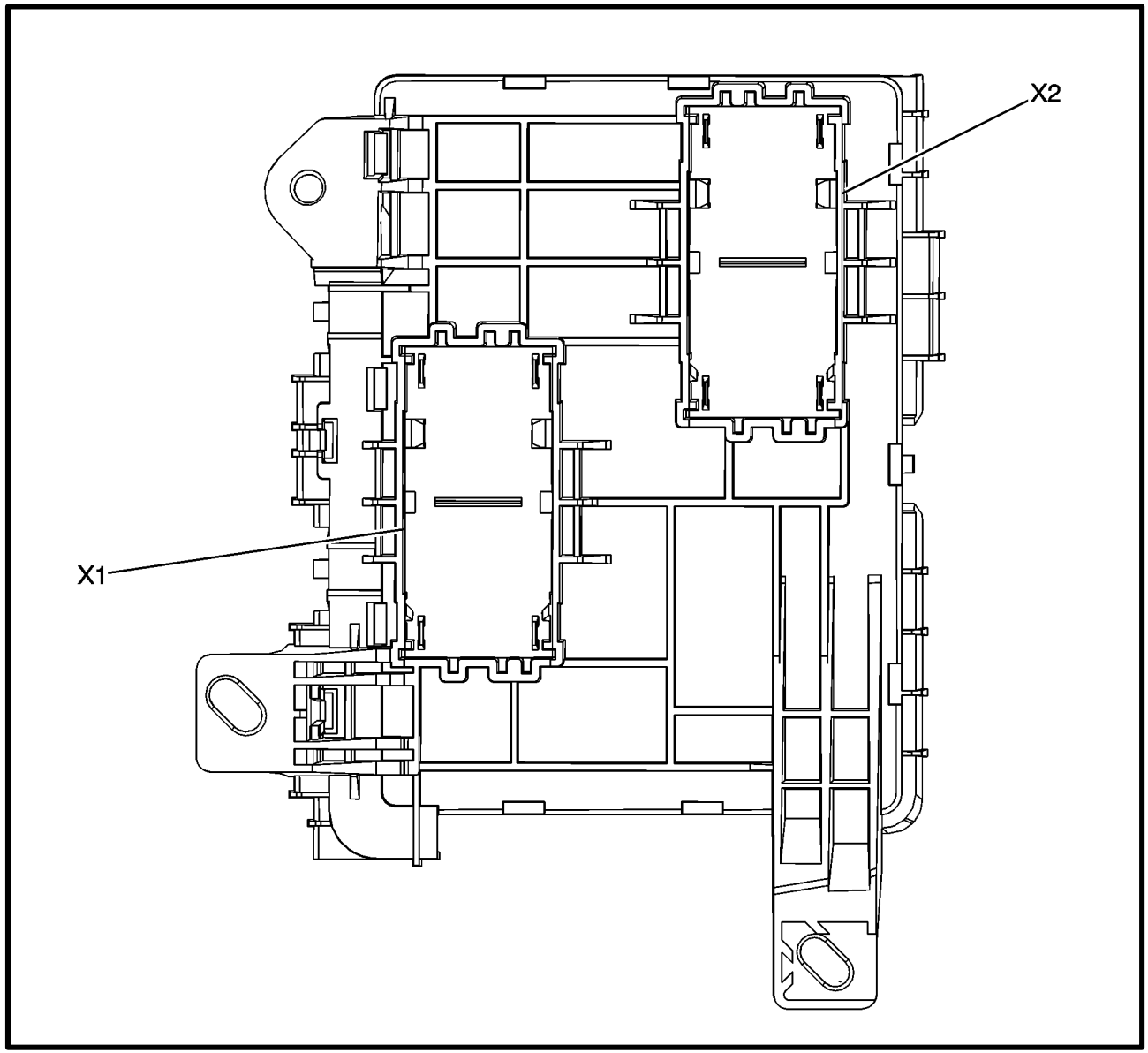
Fuse Block (X51R) Instrument Panel - Connector X3



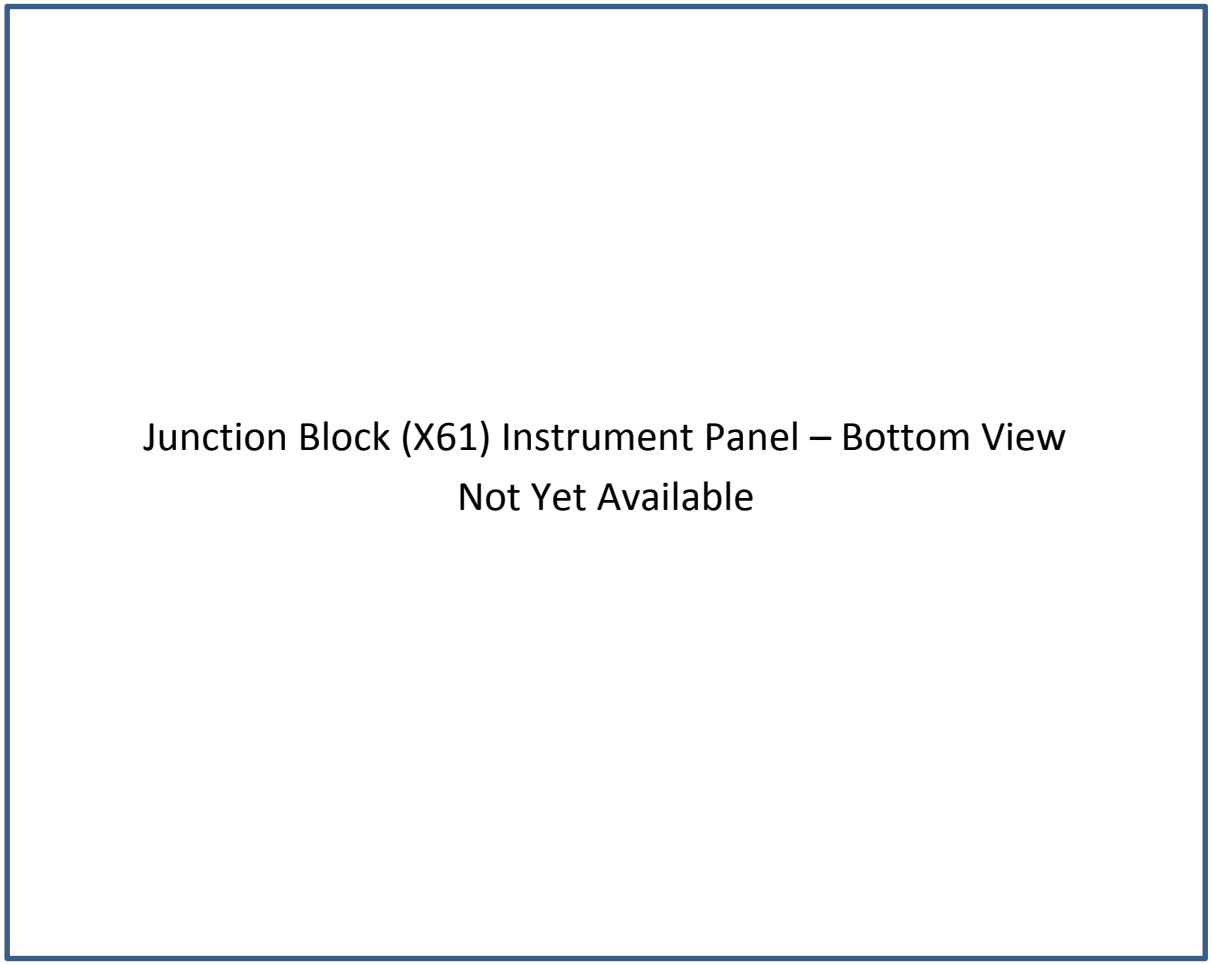
Fuse Block (X51R) Instrument Panel - Connector X3 Pin-outs

X51R Fuse Block - Instrument Panel Right X3				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	2.5	RD/L-GN	3140	Battery Positive Voltage
2-7	-	-	-	Not Occupied
8	0.5	VT/GY	709	Left Park Lamp Supply Voltage
9	-	-	-	Not Occupied
10	0.5 2.5	BK BK	1050 1050	Ground Ground
11-20	-	-	-	Not Occupied

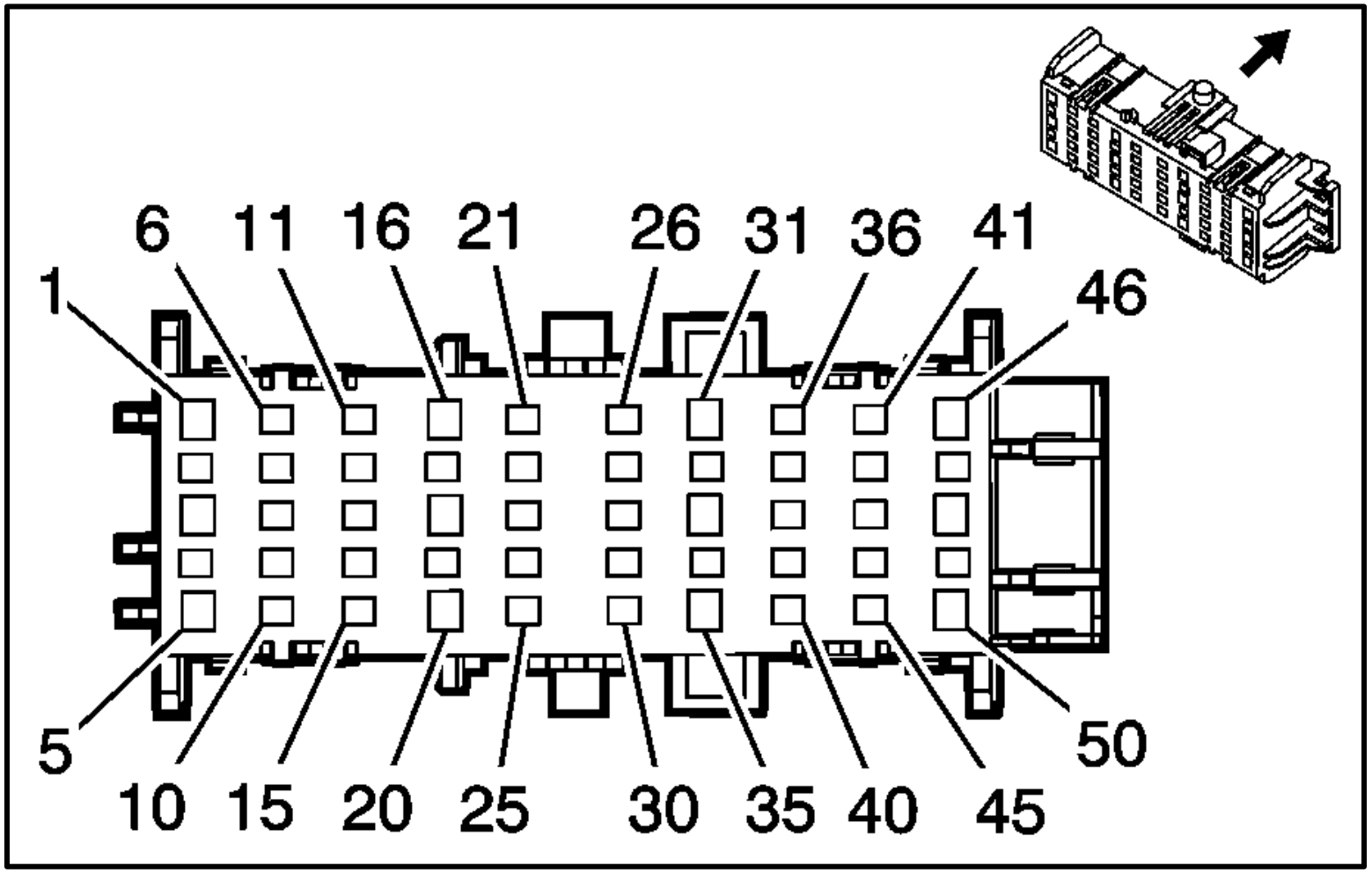
Junction Block (X61) Instrument Panel – Top View



Junction Block (X61) Instrument Panel – Bottom View



Junction Block (X61) Instrument Panel – Connector X1

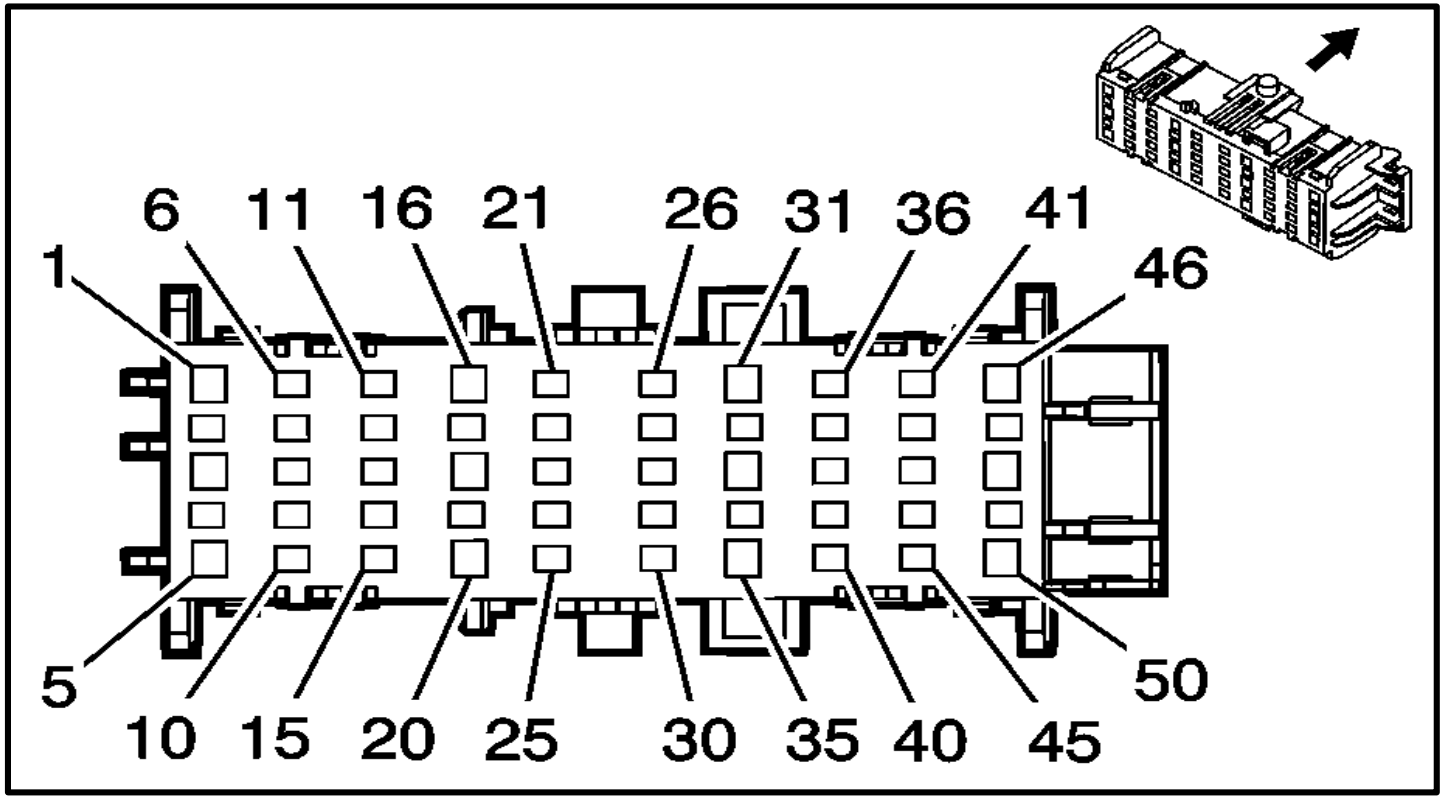


Junction Block (X61) Instrument Panel – Connector X1 Pin-outs

X61A Junction Block - Instrument Panel X1				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	-	-	-	Not Occupied
2	0.5	GY/BK	1570	Front Axle Actuator Control
3-10	-	-	-	Not Occupied
11	0.35	GY/L-GN	2555	Rear Park Assist Disable Signal
12-15	-	-	-	Not Occupied
16	2.5	RD/L-GN	965	
17	0.75	WH/VT	1430	Exterior Courtesy Lamp Supply Voltage
18	0.5	D-BU/YE	6105	High Speed GMLAN Serial Data (+) (2)
19	0.5	D-BU/YE	6105	High Speed GMLAN Serial Data (+) (2)
20	0.5	WH	6106	High Speed GMLAN Serial Data (-) (2)
21	0.5	D-BU/L-GN	961	
22	0.35	VT	185	Low Washer Fluid Indicator Control
23	0.35	BN/YE	780	Driver Door Lock Switch Lock Signal
24	0.5	BN	7634	Integrated Trailer Brake Contoller Redundant Manual Apply Signal
25	0.35	GY	5697	Child Lockout Indicator
26	0.5	D-BU/RD	7632	Integrated Trailer Brake Controller Switch 5 Volt Reference
27	0.5	BK/BN	7631	Integrated Trailer Brake Controller Switch Low Reference
28	0.35	BN/WH	781	Driver Door Lock Switch Unlock Signal
29	0.5	YE	7635	Integrated Trailer Brake Controller Manual Apply Signal
30	0.5	D-BU/L-GN	963	
31	2.5	RD/L-GN	966	
32	0.5	WH	6106	High Speed GMLAN Serial Data (-) (2)

X61A Junction Block - Instrument Panel X1				
Pin	**Size**	**Color**	**Circuit**	**Function**
33	0.5	VT/BN	300	Run Ignition 3 Voltage
34	0.5	D-BU/L-GN	962	
35	2.5	RD/L-GN	967	
36	0.35	WH/GY	5285	Adjustable Pedal Switch Rearward Signal
37	-	-	-	Not Occupied
38	0.5	D-BU/L-GN	964	
39	0.75	D-BU/VT	1134	Park Brake Switch Signal
40	0.5	L-GN	5060	Low Speed GMLAN Serial Data
41	0.5	L-GN/BK	7633	Integrated Trailer Brake Controller User Gain Signal
42	0.35	L-GN/GY	5286	Adjustable Pedal Switch Forward Signal
43	-	-	-	Not Occupied
44	0.5	WH/D-BU	3691	Trailer Brake Apply Signal
45	0.35	L-GN/BN	5852	Rear Park Assist LED Disable Signal
46	0.5	VT/WH	1939	Run/Crank Ignition 1 Voltage
47	0.5	WH	6816	Indicator Dimming Control
48	2.5	RD/L-GN	968	
49	0.5	YE/WH	816	Brake Transmission Shift Interlock Solenoid Control
50	2.5	BK	2550	Ground

Junction Block (X61) Instrument Panel – Connector X2



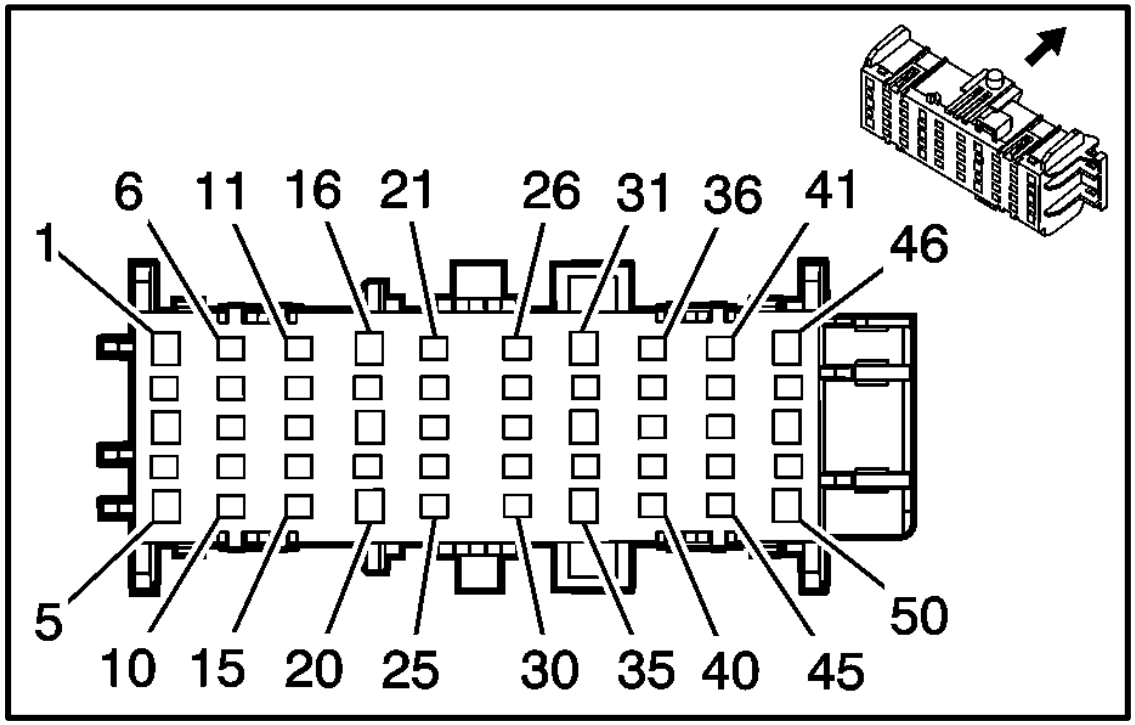
Junction Block (X61) Instrument Panel – Connector X2 Pin-outs

X61A Junction Block - Instrument Panel X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
1-2	-	-	-	Not Occupied
3	4	RD/GY	1342	Battery Positive Voltage
4	0.35	D-BU	2307	Passenger Air Bag On Indicator Control

X61A Junction Block - Instrument Panel X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
5	0.5	RD/L-GN	3140	Battery Positive Voltage
6	0.5	WH	2501	High Speed GMLAN Serial Data (-) (1)
7	0.5	D-BU	2500	High Speed GMLAN Serial Data (+) (1)
8	0.35	WH/RD	6207	Memory Sensor High Reference
9	0.35	BK/YE	1691	Automatic Day/Night Mirror Low Reference
10	0.35	YE/WH	1690	Automatic Day/Night Mirror Signal
11	0.35	D-BU	5952	Adjustable Pedal Position Sensor Brake Signal
12	1.5 0.75	YE YE	5129 5129	Adjustable Pedal Actuator Rearward Control Adjustable Pedal Actuator Rearward Control
13-14	-	-	-	Not Occupied
15	0.5	L-GN/WH	24	Backup Lamp Supply Voltage
16	2.5	YE/BN	1569	Transfer Case Lock Solenoid Control
17	-	-	-	Not Occupied
18	4	BK	550	Ground
19	0.35	VT/WH	5234	Passenger Seat Belt Indicator
20	-	-	-	Not Occupied
21	1.5 0.75	L-GN/VT L-GN/VT	5130 5130	Adjustable Pedal Actuator Forward Control Adjustable Pedal Actuator Forward Control
22	0.35	BK/GY	6206	Memory Sensor Low Reference
23	0.5	WH/BN	6815	Inadvertent Power Control
24	0.35	L-GN	2308	Passenger Air Bag Off Indicator Control
25	-	-	-	Not Occupied
26	0.35	D-BU/GY	7473	Incremental Encoder Impulse Signal

X61A Junction Block - Instrument Panel X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
27	0.35	VT	7476	Incremental Encoder Sensor Return
28	-	-	-	Not Occupied
29	0.5	GY	157	Interior Lamp Control
30	0.35	GY	156	Courtesy Lamp Switch Signal
31	4	YE/VT	1553	Transfer Case Motor Counter Clockwise Control
32	0.35	YE	7474	Incremental Encoder Direction Signal
33	0.5	VT/GY	1054	Stop Lamp Supply Voltage
34	-	-	-	Not Occupied
35	2.5	RD/L-GN	242	Battery Positive Voltage
36	0.35	WH/L-GN	7475	Incremental Encoder Sensor (8V) Supply
37	0.5	YE/WH	1695	Four Wheel Drive Wheel Lock Indicator
38	0.35	VT/YE	5985	Accessory Wakeup Serial Data
39-43	-	-	-	Not Occupied
44	0.5	WH/D-BU	3691	Trailer Brake Apply Signal
45	-	-	-	Not Occupied
46	4	YE/GY	1552	Transfer Case Motor Clockwise Control
47	0.5	L-GN/GY	817	Vehicle Speed Signal
48	2.5	D-BU	47	Trailer Auxiliary Supply Voltage
49	-	-	-	Not Occupied
50	0.35	VT/YE	43	Accessory Voltage

Junction Block (X61) Instrument Panel – Connector X3

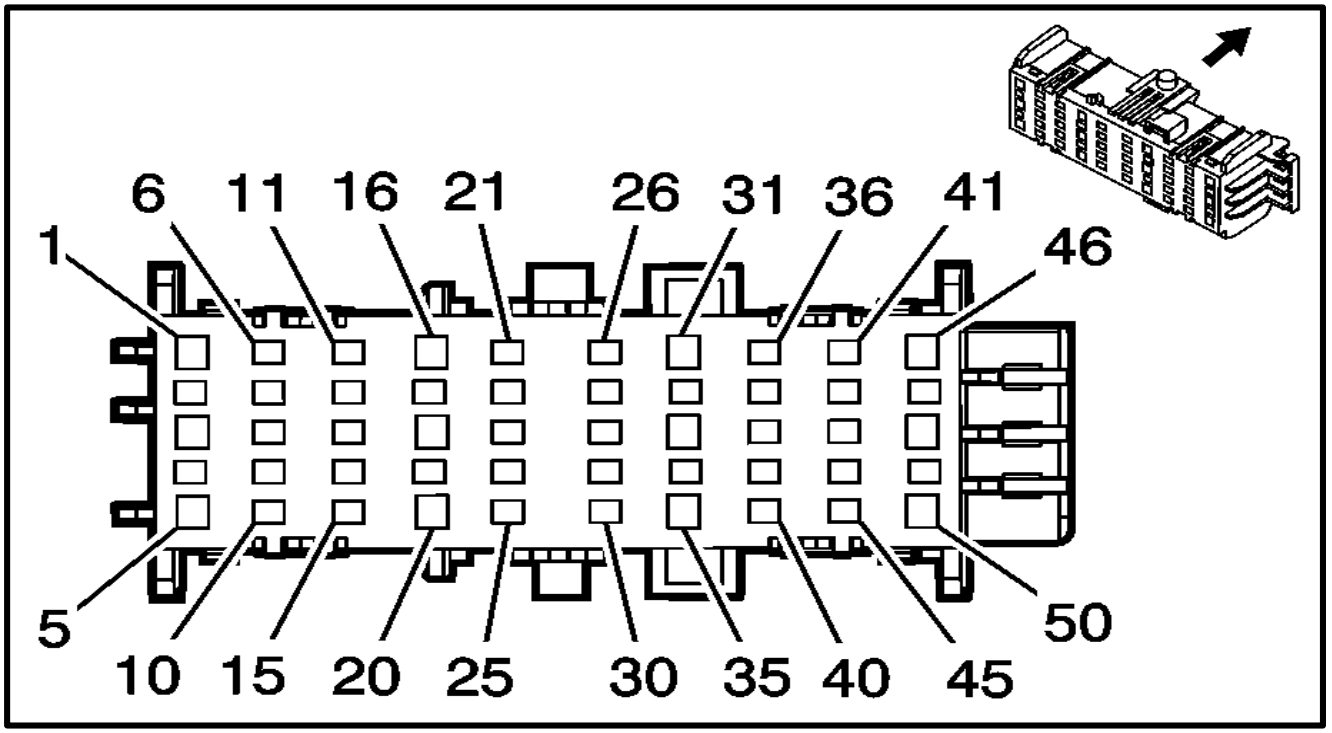


Junction Block (X61) Instrument Panel – Connector X3 Pin-outs

X61A Junction Block - Instrument Panel X3				
Pin	**Size**	**Color**	**Circuit**	**Function**
1-2	-	-	-	Not Occupied
3	0.5	RD/L-GN	3140	Battery Positive Voltage
4	0.35	D-BU	2307	Passenger Air Bag On Indicator Control
5-6	-	-	-	Not Occupied
7	0.75	WH/VT	1430	Exterior Courtesy Lamp Supply Voltage
8	0.35	YE/WH	1690	Automatic Day/Night Mirror Signal
9	0.35	BK/YE	1691	Automatic Day/Night Mirror Low Reference
10-12	-	-	-	Not Occupied
13	0.5	L-GN/WH	24	Backup Lamp Supply Voltage
14-16	-	-	-	Not Occupied
17	0.35	L-GN/BK	2515	Keypad Supply Voltage
18	-	-	-	Not Occupied
19	0.35	VT/WH	5234	Passenger Seat Belt Indicator
20	-	-	-	Not Occupied
21	0.35	L-GN/WH	2514	Keypad Signal
22	0.35	YE/VT	2516	Keypad Green LED
23	-	-	-	Not Occupied
24	0.35	L-GN	2308	Passenger Air Bag Off Indicator Control
25	0.5	WH/BN	6815	Inadvertent Power Control
26	0.35	WH	6192	Power Sliding Window Switch Close Signal
27	0.5	YE	6817	LED Backlight Dimming Control
28	0.35	GY	156	Courtesy Lamp Switch Signal

X61A Junction Block - Instrument Panel X3				
Pin	**Size**	**Color**	**Circuit**	**Function**
29	0.5	GY	157	Interior Lamp Control
30-31	-	-	-	Not Occupied
32	0.35	YE/VT	6191	Power Sliding Window Switch Open Signal
33-34	-	-	-	Not Occupied
35	0.5	VT/GY	1054	Stop Lamp Supply Voltage
36	0.35	BN/WH	2517	Keypad Red LED
37-40	-	-	-	Not Occupied
41	0.35	GY/L-GN	328	Interior Lamp Defeat Switch Signal
42	0.35	VT/L-GN	7558	LED Ambient Lighting Control 2
43-44	-	-	-	Not Occupied
45	0.35	GY/WH	3153	Lane Departure Warning Disable Switch Signal
46	2.5	BK	1050	Ground
47	0.35	L-GN	5060	Low Speed GMLAN Serial Data
48	-	-	-	Not Occupied
49	0.35	WH	3152	Lane Departure Warning Indicator Control
50	-	-	-	Not Occupied

Junction Block (X61) Instrument Panel – Connector X4



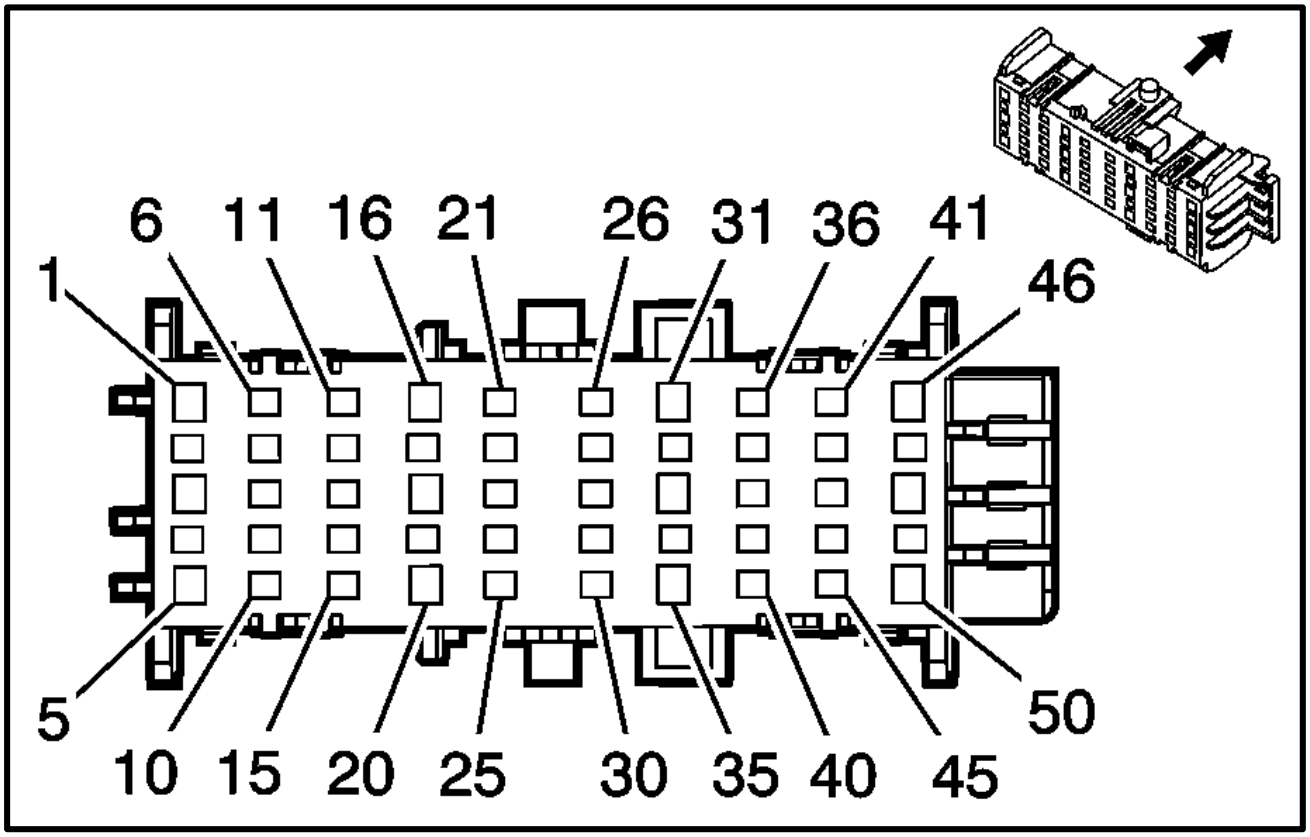
Junction Block (X61) Instrument Panel – Connector X4 Pin-outs

X61A Junction Block - Instrument Panel X4				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	-	-	-	Not Occupied
2	0.35	YE/VT	2516	Keypad Green LED
3	0.35	BK/L-GN	552	Sensor Low Reference
4	0.5	WH	2501	High Speed GMLAN Serial Data (-) (1)
5	0.5	D-BU	2500	High Speed GMLAN Serial Data (+) (1)
6	0.5	YE	6817	LED Backlight Dimming Control

X61A Junction Block - Instrument Panel X4				
Pin	**Size**	**Color**	**Circuit**	**Function**
7	0.35	L-GN/WH	2514	Keypad Signal
8	0.35	GY/RD	598	5 Volt Reference
9	0.35	WH/L-GN	526	Stop Lamp Switch Signal
10	0.35	D-BU/YE	1693	Four Wheel Drive Switch Signal
11	0.35	GY/WH	3153	Lane Departure Warning Disable Switch Signal
12	0.35	YE/VT	6191	Power Sliding Window Switch Open Signal
13	0.35	WH	6192	Power Sliding Window Switch Close Signal
14	0.35	BN	1560	Neutral Indicator Control
15	0.35	GY/RD	6029	Four Wheel Drive Mode Switch 5 Volt Reference
16	2.5	BK	1050	Ground
17-18	-	-	-	Not Occupied
19	0.35	L-GN/BK	2515	Keypad Supply Voltage
20	-	-	-	Not Occupied
21	0.5	VT/L-GN	7558	LED Ambient Lighting Control 2
22	0.35	BN/WH	2517	Keypad Red LED
23	0.35	BN/BK	1566	4 HI Indicator Control
24	0.35	VT/WH	1565	4 LO Indicator Control
25	0.35	VT/L-GN	1739	Run/Crank Ignition 1 Voltage
26	0.35	WH	3152	Lane Departure Warning Indicator Control
27	0.35	GY/L-GN	328	Interior Lamp Defeat Switch Signal
28-29	-	-	-	Not Occupied
30	0.35	GY/L-GN	1561	AWD Indicator Control
31	1.5	RD/YE	2340	Battery Positive Voltage

X61A Junction Block - Instrument Panel X4				
Pin	**Size**	**Color**	**Circuit**	**Function**
32	0.5	BK/WH	1851	Signal Ground
33	0.35 0.75	BK/WH BK/WH	1851 1851	Signal Ground Signal Ground
34	-	-	-	Not Occupied
35	2.5	BK/WH	1851	Signal Ground
36-37	-	-	-	Not Occupied
38	0.5	BK/WH	1851	Signal Ground
39	-	-	-	Not Occupied
40	0.35	L-GN/BK	1563	2 HI Indicator Control
41	0.35	BK/WH	1851	Signal Ground
42-43	-	-	-	Not Occupied
44	0.35	BK	2550	Ground
45	0.35	BK	2550	Ground
46	0.75	BK	2550	Ground
47	0.35	BK	2550	Ground
48	0.75 0.5	BK BK	2550 2550	Ground Ground
49	0.35	BK	2550	Ground
50	0.75	BK	2550	Ground

Junction Block (X61) Instrument Panel – Connector X5



Junction Block (X61) Instrument Panel – Connector X5 Pin-outs

X61A Junction Block - Instrument Panel X5				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	0.5	WH	6106	High Speed GMLAN Serial Data (-) (2)
2	0.5	D-BU/YE	6105	High Speed GMLAN Serial Data (+) (2)
3	0.5	D-BU/YE	6105	High Speed GMLAN Serial Data (+) (2)
4	0.75	WH/VT	1430	Exterior Courtesy Lamp Supply Voltage
5	-	-	-	Not Occupied
6	0.35	GY	5697	Child Lockout Indicator
7	0.5	BN	7634	Integrated Trailer Brake Controller Redundant Manual Apply Signal
8	0.35	BN/YE	780	Driver Door Lock Switch Lock Signal
9	0.35	VT	185	Low Washer Fluid Indicator Control
10	0.5	D-BU/L-GN	961	
11	0.5	D-BU/L-GN	963	
12	0.5	YE	7635	Integrated Trailer Brake Controller Manual Apply Signal
13	0.35	BN/WH	781	Driver Door Lock Switch Unlock Signal
14	0.5	BK/BN	7631	Integrated Trailer Brake Controller Switch Low Reference
15	0.5	D-BU/RD	7632	Integrated Trailer Brake Controller Switch 5 Volt Reference
16	-	-	-	Not Occupied
17	0.5	D-BU/L-GN	962	
18	0.5	VT/BN	300	Run Ignition 3 Voltage
19	0.5	WH	6106	High Speed GMLAN Serial Data (-) (2)
20-21	-	-	-	Not Occupied
22	0.5	D-BU/VT	1134	Park Brake Switch Signal
23	0.5	D-BU/L-GN	964	

X61A Junction Block - Instrument Panel X5				
Pin	**Size**	**Color**	**Circuit**	**Function**
24	-	-	-	Not Occupied
25	0.35	WH/GY	5285	Adjustable Pedal Switch Rearward Signal
26	0.35	L-GN/BN	5852	Rear Park Assist LED Disable Signal
27	0.5	WH/D-BU	3691	Trailer Brake Apply Signal
28	-	-	-	Not Occupied
29	0.35	L-GN/GY	5286	Adjustable Pedal Switch Forward Signal
30	0.5	L-GN/BK	7633	Integrated Trailer Brake Controller User Gain Signal
31	0.35	BK	2550	Ground
32	0.5	YE/WH	816	Brake Transmission Shift Interlock Solenoid Control
33	-	-	-	Not Occupied
34	0.5	WH	6816	Indicator Dimming Control
35-36	-	-	-	Not Occupied
37	0.35	WH	6816	Indicator Dimming Control
38	0.35	WH	6816	Indicator Dimming Control
39-44	-	-	-	Not Occupied
45	0.35	GY/L-GN	2555	Rear Park Assist Disable Signal
46-50	-	-	-	Not Occupied

Junction Block (X61) Instrument Panel – Connector X6

Reserved space for Junction Block x61 Connector X6

(Graphic # 1665705)

Junction Block (X61) Instrument Panel – Connector X6 Pin-outs

X61A Junction Block - Instrument Panel X6				
Pin	**Size**	**Color**	**Circuit**	**Function**
A	0.5	BK	1050	Ground
B	0.5	WH/BU	3691	Trailer Brake Apply Signal
C	2.5	RD/GN	242	Battery Positive Voltage
D	2.5	BU	47	Trailer Auxiliary Supply Voltage

Junction Block (X61) Instrument Panel – Connector X7

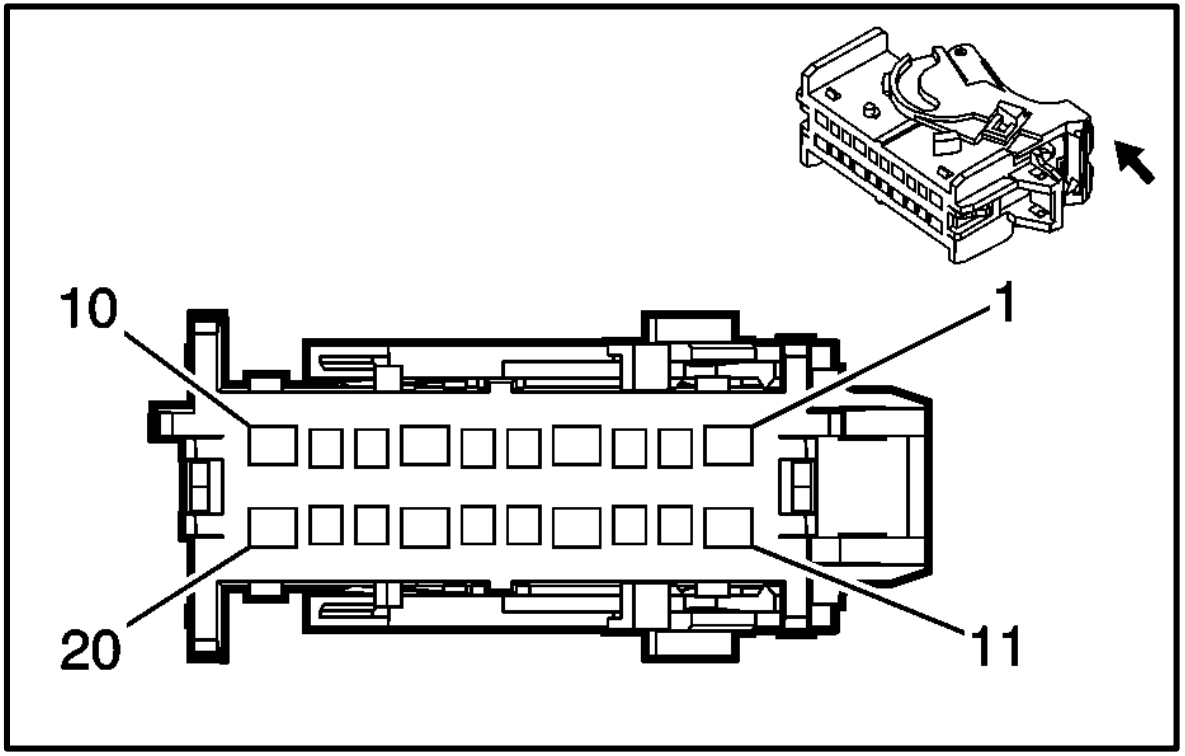
Reserved space for Junction Block x61 Connector X7

(Graphic # TBD)

Junction Block (X61) Instrument Panel – Connector X7 Pin-outs

X61A Junction Block - Instrument Panel X7						
Pin	**Size**	**Color**	**Circuit**	**Function**	**Terminal Type ID**	**Option**
1	0		968		I	9L7
2-3	-	-	-	Not Occupied	-	-
4	0		967		I	9L7
5-6	-	-	-	Not Occupied	-	-
7	0	RD/YE	2340	Battery Positive Voltage	I	-
8	0	VT/YE	43	Accessory Voltage	I	-
9	0	GN	5060	Low Speed GMLAN Serial Data	I	-
10	0	BK	1050	Ground	I	-
11	0	VT/WH	1939	Run/Crank Ignition 1 Voltage	I	-
12-13	-	-	-	Not Occupied	-	-
14	0		966		I	9L7
15-16	-	-	-	Not Occupied	-	-
17	0	RD/YE	2340	Battery Positive Voltage	I	-
18	-	-	-	Not Occupied	-	-
19	0	GN/GY	817	Vehicle Speed Signal	I	-
20	0		965		I	9L7

Junction Block (X61) Instrument Panel – Connector X8



Junction Block (X61) Instrument Panel – Connector X8 Pin-outs

X61A Junction Block - Instrument Panel X8				
Pin	**Size**	**Color**	**Circuit**	**Function**
1-7	-	-	-	Not Occupied
8	0.5	WH/GN	526	Stop Lamp Switch Signal
9	0.5 0.5	WH WH	2501 2501	High Speed GMLAN Serial Data (-) (1) High Speed GMLAN Serial Data (-) (1)
10	0.5 0.5	BU BU	2500 2500	High Speed GMLAN Serial Data (+) (1) High Speed GMLAN Serial Data (+) (1)
11	-	-	-	Not Occupied
12	0.5 0.5	WH WH	2501 2501	High Speed GMLAN Serial Data (-) (1) High Speed GMLAN Serial Data (-) (1)
13	0.5 0.5	BU BU	2500 2500	High Speed GMLAN Serial Data (+) (1) High Speed GMLAN Serial Data (+) (1)
14	0.5	WH/RD	6207	Memory Sensor High Reference
15	0.5	BU	5952	Adjustable Pedal Position Sensor Brake Signal
16	1.5	YE	5129	Adjustable Pedal Actuator Rearward Control
17	0.5	BK/GY	6206	Memory Sensor Low Reference
18	1.5	GN/VT	5130	Adjustable Pedal Actuator Forward Control
19	0.5	BK/GN	552	Sensor Low Reference
20	0.5	GY/RD	598	5 Volt Reference

Junction Block (X61) Instrument Panel – Connector X9

Reserved space for Junction Block x61 Connector X9

(Graphic # TBD)

Junction Block (X61) Instrument Panel – Connector X9 Pin-outs

X61A Junction Block - Instrument Panel X9				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	2.5	YE/BN	1569	Transfer Case Lock Solenoid Control
2	0.35	BU/YE	1693	Four Wheel Drive Switch Signal
	0.35	BU/YE	1693	Four Wheel Drive Switch Signal
3	0.35	GY/RD	6029	Four Wheel Drive Mode Switch 5 Volt Reference
	0.35	GY/RD	6029	Four Wheel Drive Mode Switch 5 Volt Reference

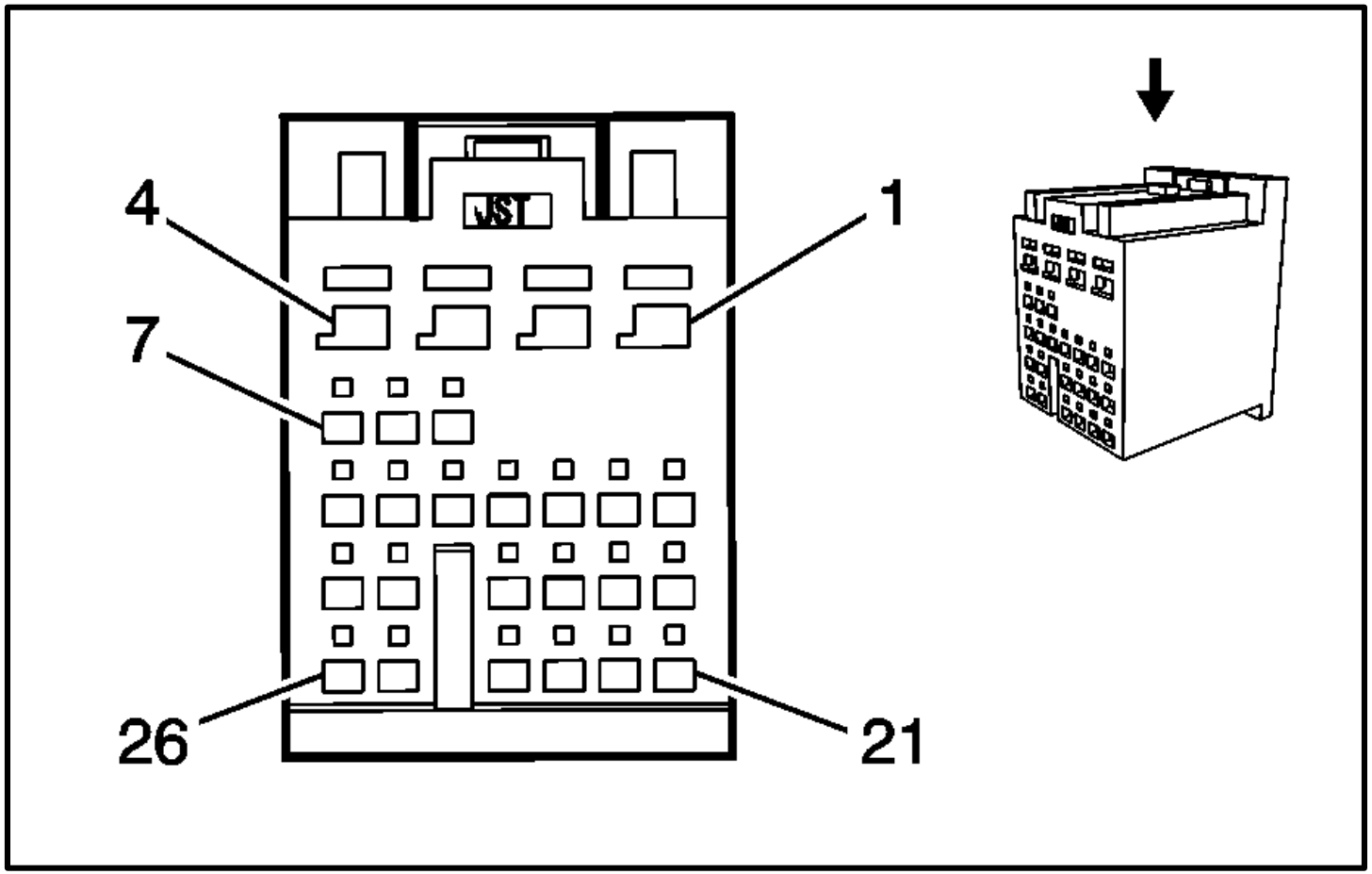
X61A Junction Block - Instrument Panel X9				
Pin	**Size**	**Color**	**Circuit**	**Function**
4	0.35	BN/BK	1566	4 HI Indicator Control
	0.35	BN/BK	1566	4 HI Indicator Control
5	0.35	VT/WH	1565	4 LO Indicator Control
	0.35	VT/WH	1565	4 LO Indicator Control
6	0.35	VT/GN	1739	Run/Crank Ignition 1 Voltage
	0.35	VT/GN	1739	Run/Crank Ignition 1 Voltage
7	0.35	VT/YE	5985	Accessory Wakeup Serial Data
	0.35	VT/YE	5985	Accessory Wakeup Serial Data
8	0.35	GN/BK	1563	2 HI Indicator Control
	0.35	GN/BK	1563	2 HI Indicator Control
9	0.35	GY/GN	1561	AWD Indicator Control
10	0.5	GY/BK	1570	Front Axle Actuator Control
	0.5	GY/BK	1570	Front Axle Actuator Control
11	3	RD/GY	1342	Battery Positive Voltage
	3	RD/GY	1342	Battery Positive Voltage
12	0.35	BN	1560	Neutral Indicator Control
	0.35	BN	1560	Neutral Indicator Control

X61A Junction Block - Instrument Panel X9				
Pin	**Size**	**Color**	**Circuit**	**Function**
13	0.35	VT	7476	Incremental Encoder Sensor Return
	0.35	VT	7476	Incremental Encoder Sensor Return
14	3	BK	550	Ground
	3	BK	550	Ground
15	0.35	BU/GY	7473	Incremental Encoder Impulse Signal
	0.35	BU/GY	7473	Incremental Encoder Impulse Signal
16	0.35	YE	7474	Incremental Encoder Direction Signal
	0.35	YE	7474	Incremental Encoder Direction Signal
17	4	YE/VT	1553	Transfer Case Motor Counter Clockwise Control
	4	YE/VT	1553	Transfer Case Motor Counter Clockwise Control
18	0.35	WH/GN	7475	Incremental Encoder Sensor (8V) Supply
	0.35	WH/GN	7475	Incremental Encoder Sensor (8V) Supply
19	0.5	YE/WH	1695	Four Wheel Drive Wheel Lock Indicator
	0.5	YE/WH	1695	Four Wheel Drive Wheel Lock Indicator
20	4	YE/GY	1552	Transfer Case Motor Clockwise Control
	4	YE/GY	1552	Transfer Case Motor Clockwise Control

Section C

K9 Body Control Module

K9 Body Control Module (BCM) – Connector X1

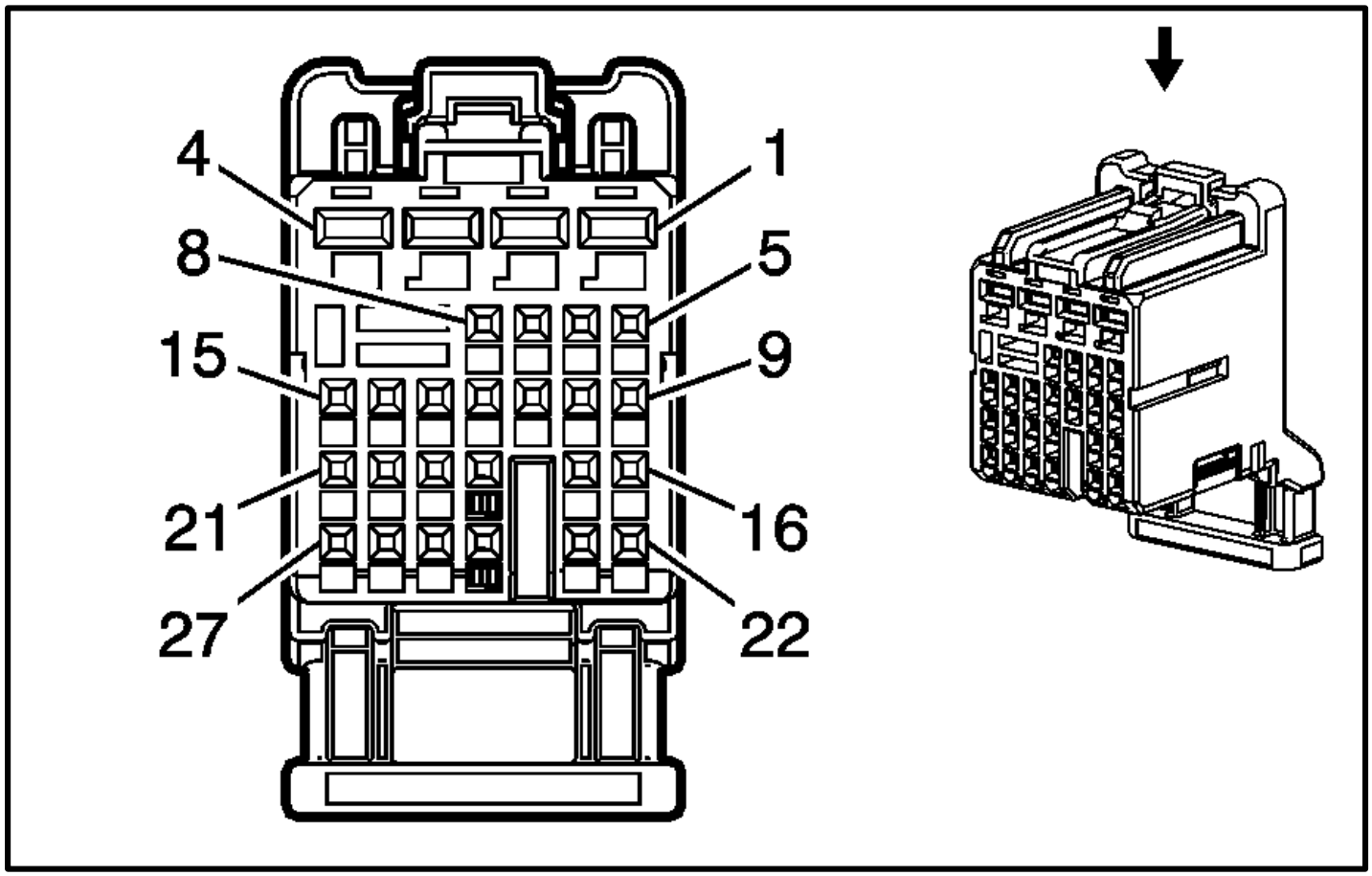


K9 Body Control Module (BCM) – Connector X1 Pin-outs

K9 Body Control Module X1				
Pin	Size	Color	Circuit	Function
1	0.75	BK	1850	Ground
2	0.75	RD/D-BU	2540	Battery Positive Voltage
3	1	RD/GY	2140	Battery Positive Voltage
4	0.5	RD/BN	2240	Battery Positive Voltage
5	0.5	WH	6816	Indicator Dimming Control
6	-	-	-	Not Occupied
7	0.35	BK/YE	5005	Instrument Panel Lamp Dimmer Switch Low Reference
8-9	-	-	-	Not Occupied
10	0.5	D-BU/VT	1134	Park Brake Switch Signal
11	0.35	L-GN/BN	306	Headlamp Switch Headlamps Off Signal Control
12	-	-	-	Not Occupied
13	0.35	D-BU/RD	1688	5 Volt Reference
14	0.35	GY/L-GN	328	Interior Lamp Defeat Switch Signal
15	0.35	D-BU/GY	192	Front Fog Lamp Switch Signal
16	0.35	WH/VT	103	Headlamp Switch On Signal
17-18	-	-	-	Not Occupied
19	0.35	BK/L-GN	552	Sensor Low Reference
20	-	-	-	Not Occupied
21	0.35	GY	728	Security Indicator Control
22	0.35	L-GN/GY	13	Headlamp Switch Park Lamp Signal

K9 Body Control Module X1				
Pin	Size	Color	Circuit	Function
23	0.5	VT/L-GN	7558	LED Ambient Lighting Control 2
24	0.5	WH	2501	High Speed GMLAN Serial Data (-) (1)
25	0.5	D-BU	2500	High Speed GMLAN Serial Data (+) (1)
26	0.35	D-BU/WH	3275	Remote Function Actuator Receive Signal

K9 Body Control Module (BCM) – Connector X2

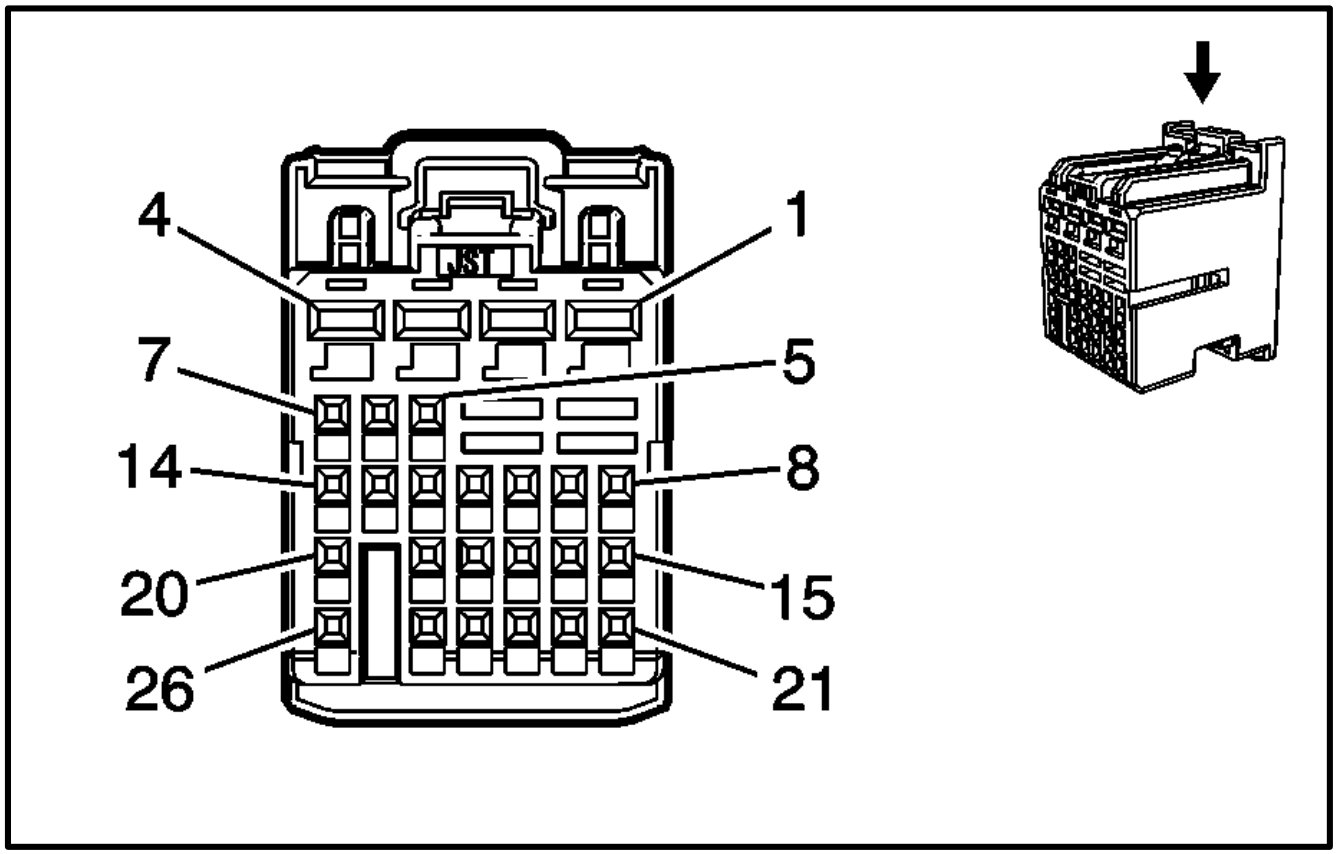


K9 Body Control Module (BCM) – Connector X2 Pin-outs

K9 Body Control Module X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	0.5	RD/WH	2740	Battery Positive Voltage
2	0.75	BK	1850	Ground
3	0.5	RD/BN	2940	Battery Positive Voltage
4	0.75	RD/VT	4040	Battery Positive Voltage
5	-	-	-	Not Occupied
6	0.35	GY	5697	Child Lockout Indicator
7	0.35	WH/L-GN	526	Stop Lamp Switch Signal
8	0.5	YE	6817	LED Backlight Dimming Control
9	0.35	YE/GY	44	Instrument Panel Lamp Dimmer Switch Signal
10	0.35	WH/D-BU	278	Ambient Light Sensor Signal
11-12	-	-	-	Not Occupied
13	0.35	GY/RD	598	5 Volt Reference
14	0.35	D-BU/VT	1788	Traction Control Switch Signal (1)
15	0.35	BN/WH	781	Driver Door Lock Switch Unlock Signal
16	0.35	GY	3273	Remote Function Actuator Return
17	-	-	-	Not Occupied
18	0.5	GY	158	Cargo Lamp Switch Signal
19	0.35	BN/YE	780	Driver Door Lock Switch Lock Signal
20	0.5	WH/D-BU	3691	Trailer Brake Apply Signal
21	0.5	L-GN/GY	6135	Linear Interconnect Network Bus 4

K9 Body Control Module X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
22-24	-	-	-	Not Occupied
25	0.35	GY/WH	3272	Remote Function Actuator Supply Voltage
26	0.35	L-GN/WH	111	Hazard Switch Signal
27	0.35	YE/L-GN	3274	Remote Function Actuator Transmit Signal

K9 Body Control Module (BCM) – Connector X4

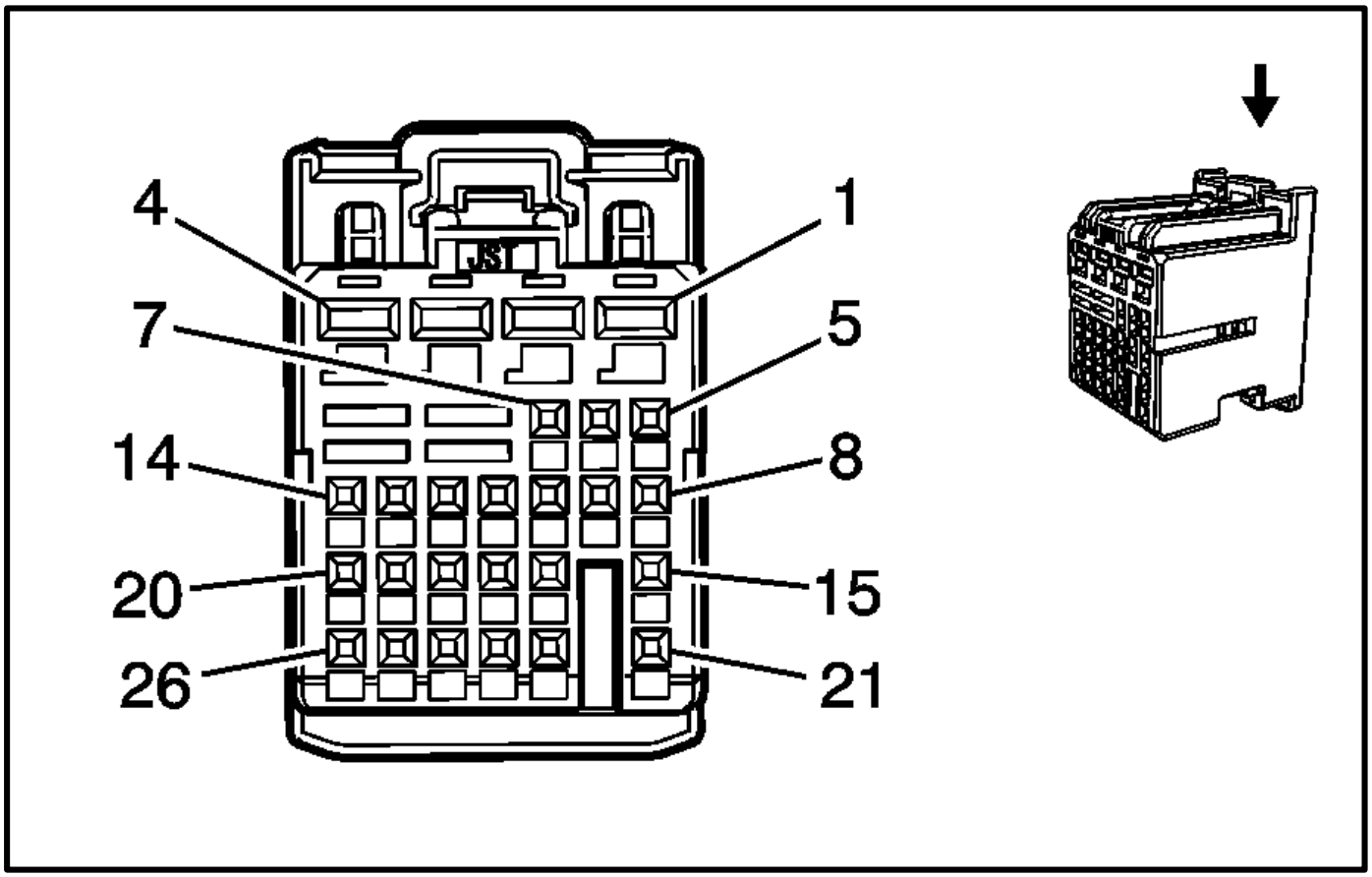


K9 Body Control Module (BCM) – Connector X4 Pin-outs

K9 Body Control Module X4				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	0.75	YE	712	Left Headlamp Low Beam Supply Voltage
2	0.75	YE	312	Right Headlamp Low Beam Supply Voltage
3	0.75	L-GN/VT	1315	Right Front Turn Signal Lamp Supply Voltage
4	0.5	BN/L-GN	19	Right Rear Stop/Turn Lamp Supply Voltage
5-6	-	-	-	Not Occupied
7	0.75	GY/D-BU	7538	Left Front DRL Supply Voltage
8-10	-	-	-	Not Occupied
11	0.5	VT/WH	5065	Stop Lamp Relay Coil Supply Voltage
12	0.35	GY/VT	755	RAP Relay Coil Control
13	0.5	L-GN/YE	6846	Rear License Lamp Supply Voltage
14	0.35	BN/GY	2268	Windshield Washer Relay Control
15	0.35	L-GN/VT	5199	Run/Crank Relay Coil Control
16	0.35	GY	91	Windshield Wiper Motor Relay Coil Supply Voltage
17	0.5	BN/L-GN	196	Windshield Wiper Motor Park Switch Signal
18	0.35	WH/YE	5075	Current Sensor Signal
19	0.35	D-BU/YE	6844	ABS/TCS Hill Descent Control Switch Signal
20	0.75	RD/YE	2340	Battery Positive Voltage
21	0.35	D-BU/VT	5076	Current Sensor Supply Voltage
22	0.35	VT/YE	5985	Accessory Wakeup Serial Data
23	0.5	WH/D-BU	5986	Serial Data Communication Enable

K9 Body Control Module X4				
Pin	**Size**	**Color**	**Circuit**	**Function**
24	0.5	BN/L-GN	109	Hood Ajar Switch Signal
25	0.5	L-GN/YE	2081	Exhaust Brake Switch Control
26	0.75	BK/WH	451	Signal Ground

K9 Body Control Module (BCM) – Connector X5

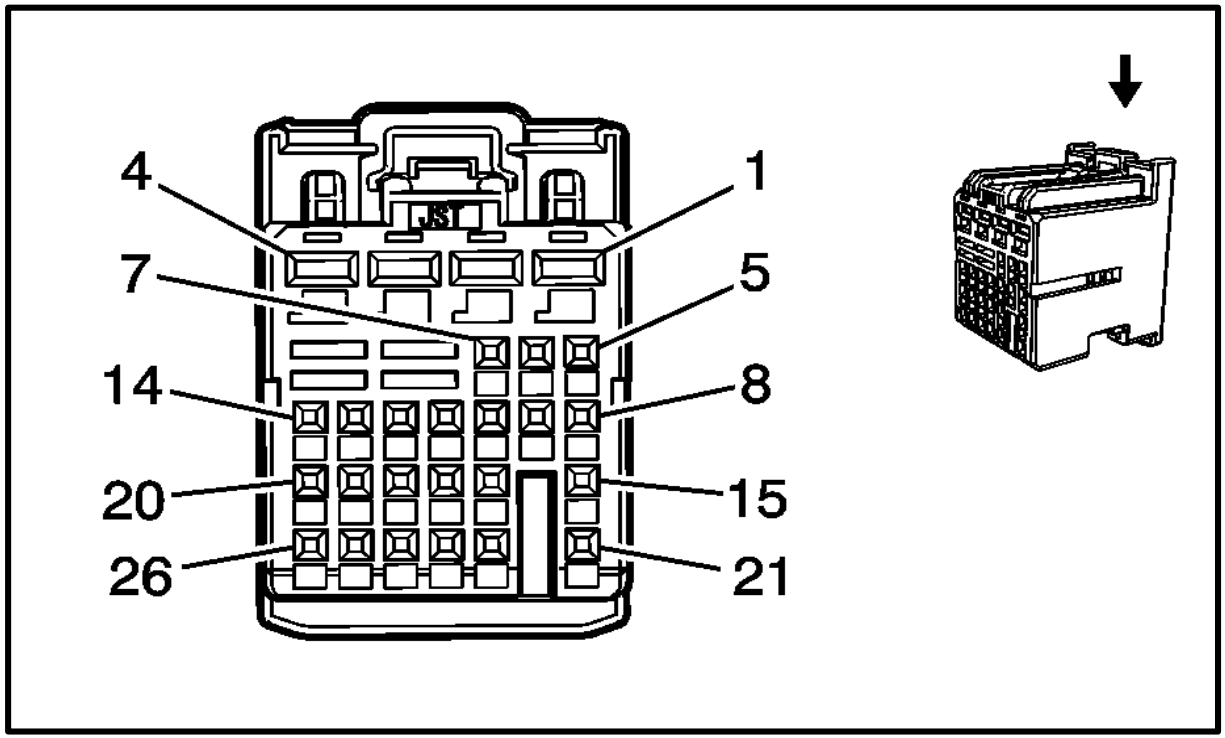


K9 Body Control Module (BCM) – Connector X5 Pin-outs

K9 Body Control Module X5				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	0.5	YE/D-BU	18	Left Rear Stop/Turn Lamp Supply Voltage
2	0.75	D-BU/WH	1314	Left Front Turn Signal Lamp Supply Voltage
3	0.75	RD/L-GN	5140	Battery Positive Voltage
4	0.75	RD/WH	3440	Battery Positive Voltage
5	-	-	-	Not Occupied
6	0.35	BK/VT	5077	Current Sensor Low Reference
7	0.75	D-BU/BN	7539	Right Front DRL Supply Voltage
8	0.35	D-BU/WH	5186	Left Trailer Turn Signal Lamp
9	-	-	-	Not Occupied
10	0.5	BN/WH	1317	Fog Lamp Relay Control
11	-	-	-	Not Occupied
12	0.35	WH/D-BU	6311	Cruise/ETC/TCC Brake Signal
13	-	-	-	Not Occupied
14	0.5	VT/BN	300	Run Ignition 3 Voltage
15	0.35	L-GN/WH	3438	Exhaust Brake Switch Signal
16	0.35	VT/YE	3267	Child Security Lock Relay Control
17	0.35	YE/GY	5187	Right Trailer Turn Signal Lamp
18	0.35	BN/VT	1969	Headlamp High Beam Relay Control
19	0.35	BN/WH	28	Horn Relay Control
20-21	-	-	-	Not Occupied

K9 Body Control Module X5				
Pin	**Size**	**Color**	**Circuit**	**Function**
22	0.35	D-BU	45	Park Lamp Relay Control
23	0.35	YE	6812	Out of Park Signal
24	0.35	WH/VT	860	Front Windshield Wiper Switch High Signal
25	-	-	-	Not Occupied
26	0.35	D-BU/BN	38	Backup Lamp Relay Control

K9 Body Control Module (BCM) – Connector X6

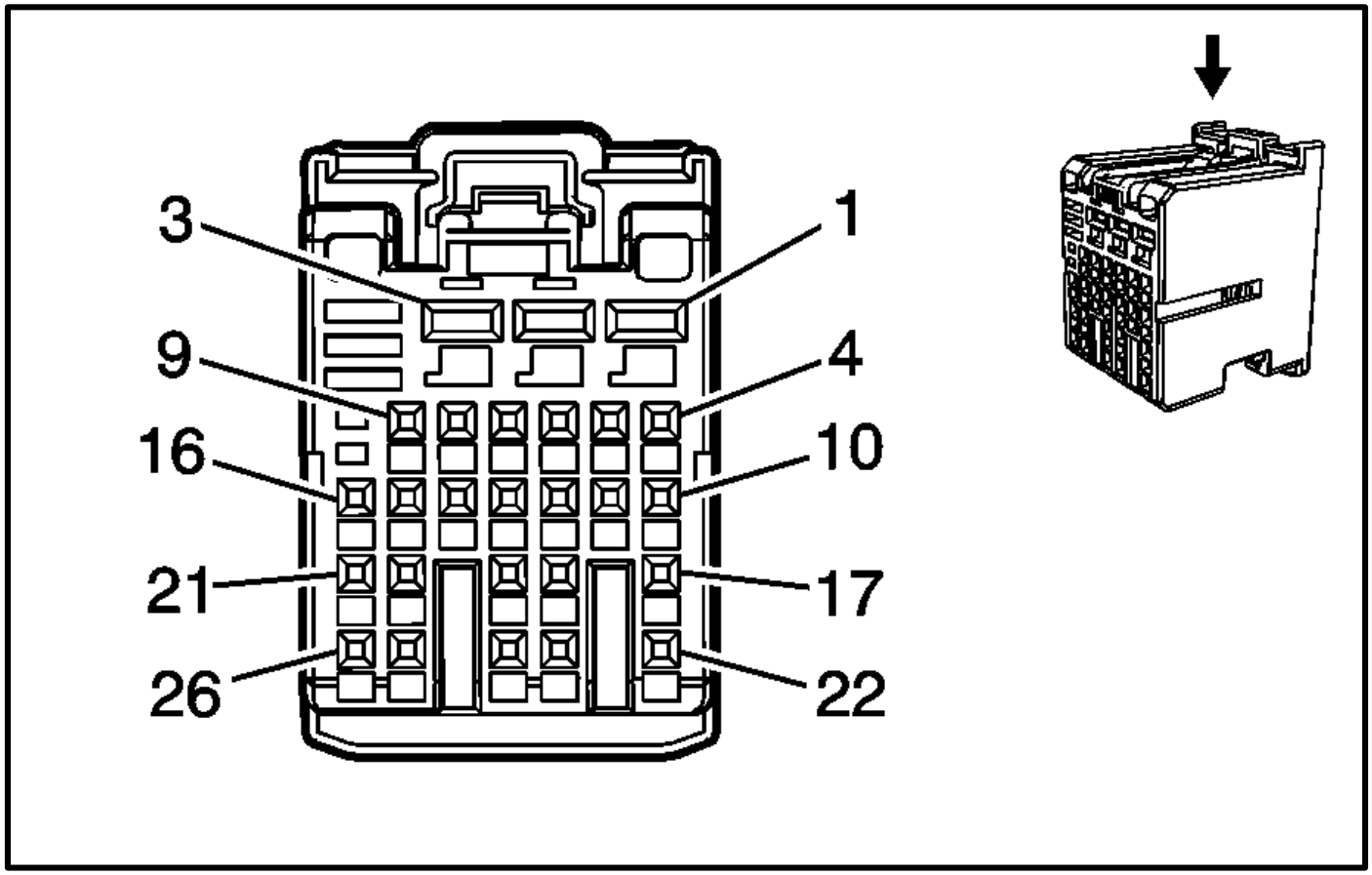


K9 Body Control Module (BCM) – Connector X6 Pin-outs

K9 Body Control Module X6				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	1.5	D-BU/WH	195	Door Lock Control
2	1.5	GY/L-GN	3271	Door Lock Control (2)
3	1.5	BK	1850	Ground

K9 Body Control Module X6				
Pin	**Size**	**Color**	**Circuit**	**Function**
4	0.75 1.5	BN/YE BN/YE	294 294	Door Lock Actuator Unlock Control Door Lock Actuator Unlock Control
5	-	-	-	Not Occupied
6	0.35	D-BU/VT	1124	Door Lock Key Switch Unlock Signal
7	-	-	-	Not Occupied
8	0.35	VT/WH	5908	Passenger Seat Vent Motor Control (1)
9	0.5	L-GN/D-BU	6133	Linear Interconnect Network Bus 2
10	0.5	L-GN/YE	6134	Linear Interconnect Network Bus 3
11-16	-	-	-	Not Occupied
17	0.35	L-GN/VT	5906	Driver Seat Vent Motor Control (1)
18-20	-	-	-	Not Occupied
21	0.35	WH/VT	3270	Driver Door Lock Motor Status
22-23	-	-	-	Not Occupied
24	0.5	D-BU	2500	High Speed GMLAN Serial Data (+) (1)
25	0.5	WH	2501	High Speed GMLAN Serial Data (-) (1)
26	0.5	BN/WH	1429	Standing Lamp Relay Control
27	-	-	-	Not Occupied

K9 Body Control Module (BCM) – Connector X7

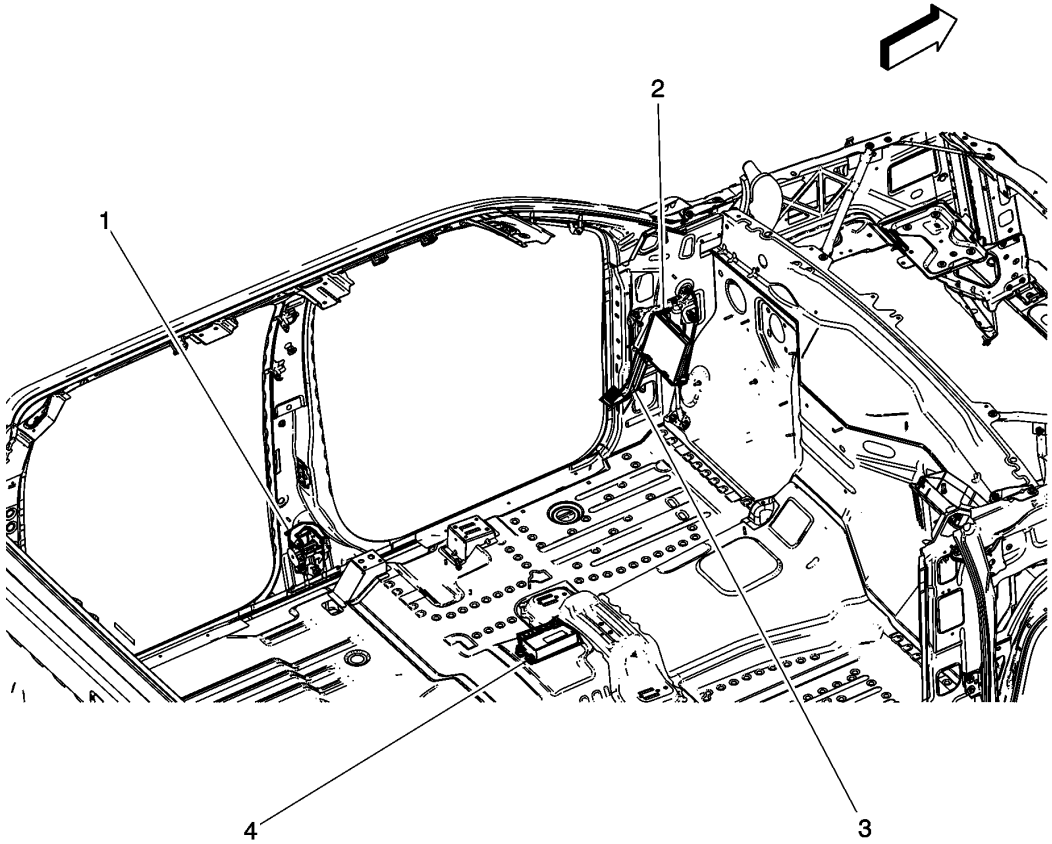


K9 Body Control Module (BCM) – Connector X7 Pin-outs

K9 Body Control Module X7				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	0.5	GY	157	Interior Lamp Control
2	-	-	-	Not Occupied
3	0.5	WH/BN	6815	Inadvertent Power Control
4-5	-	-	-	Not Occupied
6	0.5	YE/WH	816	Brake Transmission Shift Interlock Solenoid Control
7	-	-	-	Not Occupied
8	0.5	GY/L-GN	5996	Driver Outside Rear View Mirror Puddle Lamp Supply Voltage
9	0.5	YE	6817	LED Backlight Dimming Control
10-11	-	-	-	Not Occupied
12	0.35	BN/WH	3269	Child Security Lock Motor Status Signal Left Rear
13	-	-	-	Not Occupied
14	0.35	GY	746	Right Front Door Ajar Switch Signal
15	0.35	YE/BN	3265	Child Security Lock Switch Signal
16	0.5	WH/D-BU	3691	Trailer Brake Apply Signal
17	-	-	-	Not Occupied
18	0.35	GY/BK	3268	Child Security Lock Motor Status Signal Right Rear
19	0.35	GY	156	Courtesy Lamp Switch Signal
20	-	-	-	Not Occupied
21	0.35	YE/VT	244	Passenger Door Lock Switch Lock Control
22	0.35	WH/YE	7557	LED Ambient Lighting Control 1

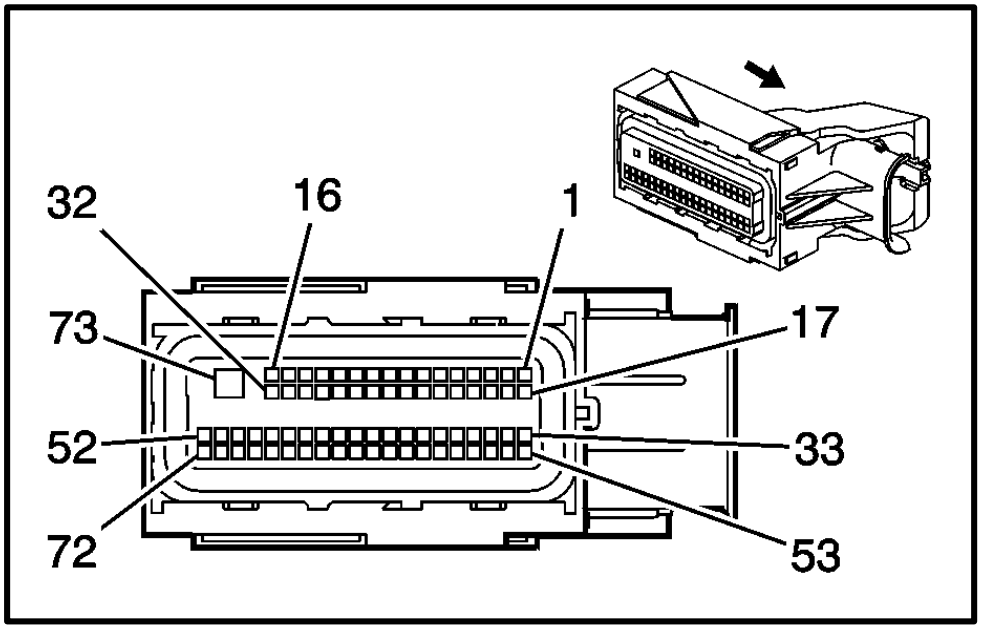
K9 Body Control Module X7				
Pin	**Size**	**Color**	**Circuit**	**Function**
23	0.5	L-GN	5060	Low Speed GMLAN Serial Data
24	0.35	BN/VT	245	Passenger Door Lock Switch Unlock Control
25	0.35	GY	745	Left Front Door Ajar Switch Signal
26	-	-	-	Not Occupied

K9 Body Control Module (BCM) – Component Location



(1) F112D Seat Belt Retractor Pretensioner – Driver
(2) K9 Body Control Module
(3) B80 Park Brake Switch
(4) K36 Inflatable Restraint Sensing and Diagnostic Module

K20 Engine Control Module (ECM) – Connector X1



K20 Engine Control Module (ECM) – Connector X1 Pin-outs

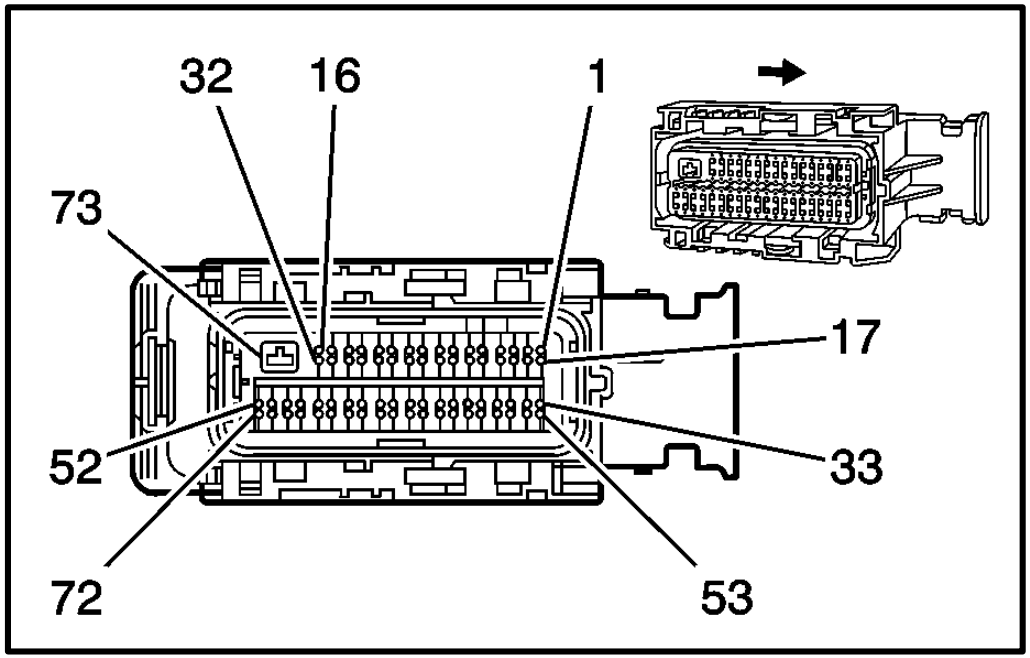
K20 Engine Control Module X1				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	-	-	-	Not Occupied
2	0.5	D-BU/WH	7446	Fuel Line Pressure Sensor Signal
3	-	-	-	Not Occupied
4	0.5	YE/WH	3200	Throttle Inlet Absolute Pressure Sensor Signal
5	0.5	WH/RD	3201	Throttle Inlet Absolute Pressure Sensor 5V Reference
6	0.5	L-GN	380	A/C Refrigerant Pressure Sensor Signal
7	-	-	-	Not Occupied

K20 Engine Control Module X1				
Pin	**Size**	**Color**	**Circuit**	**Function**
8	0.5	BK/YE	7447	Fuel Line Pressure Sensor Low Reference
9	0.5	D-BU/WH	890	Fuel Tank Pressure Sensor Signal
10	0.5	YE/RD	2709	Fuel Tank Pressure Sensor 5 Volt Reference
11-12	-	-	-	Not Occupied
13	0.5	D-BU/GY	636	Outside Ambient Air Temperature Sensor Signal
14	0.5	WH/RD	1164	Accelerator Pedal Position 5 Volt Reference (1)
15	0.5	YE/WH	1161	Accelerator Pedal Position Signal (1)
16-20	-	-	-	Not Occupied
21	0.5	BN/RD	2700	A/C Pressure Sensor 5 Volt Reference
22	0.5	BK/BN	5514	A/C Refrigerant Pressure Sensor Low Reference
23	-	-	-	Not Occupied
24	0.5	BN/RD	7445	Fuel Line Pressure Sensor 5V Reference
25	0.5	D-BU/VT	1589	Primary Fuel Level Sensor Signal
26	0.5	BK/L-GN	6281	Fuel Level Sensor Low Reference
27-29	-	-	-	Not Occupied
30	0.5	BK/D-BU	1271	Accelerator Pedal Position Low Reference (1)
31	-	-	-	Not Occupied
32	0.5	WH/GY	459	A/C Compressor Clutch Relay Control
33	0.5	BN/RD	1274	Accelerator Pedal Position 5 Volt Reference (2)
34	0.5	L-GN/WH	1162	Accelerator Pedal Position Signal (2)
35	-	-	-	Not Occupied
36	0.5	D-BU/BK	7493	High Speed GMLAN Serial Data (+)(3)
37	0.5	WH	7494	High Speed GMLAN Serial Data (-)(3)
38	0.5	WH	1579	Fuel Temperature/Composition Signal

K20 Engine Control Module X1				
Pin	**Size**	**Color**	**Circuit**	**Function**
39	0.5	D-BU	2500	High Speed GMLAN Serial Data (+) (1)
40	0.5	WH	2501	High Speed GMLAN Serial Data (-) (1)
41-43	-	-	-	Not Occupied
44	0.5	GY	5660	Fuel Pump Controller Data Out Signal
45	-	-	-	Not Occupied
46	0.5	BN/WH	419	Check Engine Indicator Control
47	0.5 0.5	GY/RD WH	6109 5359	Clutch Apply Sensor Voltage Reference Brake Apply Sensor Supply Voltage
48	0.5 0.5	YE D-BU/YE	6111 5361	Clutch Apply Sensor Signal Brake Apply Sensor Signal
49-50	-	-	-	Not Occupied
51	0.5	VT/L-GN	439	Run/Crank Ignition 1 Voltage
52	0.5	RD/BN	440	Battery Positive Voltage
53	0.5	BK/PU	1272	Accelerator Pedal Position Low Reference (2)
54-56	-	-	-	Not Occupied
57	0.5	WH/D-BU	6311	Cruise/ETC/TCC Brake Signal
58	-	-	-	Not Occupied
59	0.5	BN/YE	473	High Speed Cooling Fan Relay Control
60	0.5	YE/WH	1695	Four Wheel Drive Wheel Lock Indicator
61	0.5	GY/BK	1694	Four Wheel Drive Low Signal
62	0.5	VT/D-BU	5291	Powertrain Main Relay Fused Supply (2)
63	0.5	YE/BK	625	Starter Enable Relay Control
64-65	-	-	-	Not Occupied

K20 Engine Control Module X1				
Pin	**Size**	**Color**	**Circuit**	**Function**
66	0.5	WH	1310	EVAP Canister Vent Solenoid Control
67	0.5	VT/D-BU	5292	Powertrain Main Relay Fused Supply (3)
68	0.5 0.5	BK/GY BK/BN	6110 5360	Clutch Apply Sensor Low Reference Brake Apply Sensor Low Reference
69	-	-	-	Not Occupied
70	0.5	VT/YE	5985	Accessory Wakeup Serial Data
71	-	-	-	Not Occupied
72	0.5	YE	5991	Powertrain Relay Coil Control
73	2.5	VT/D-BU	5290	Powertrain Main Relay Fused Supply (1)

K20 Engine Control Module (ECM) – Connector X2



K20 Engine Control Module (ECM) – Connector X2 Pin-outs

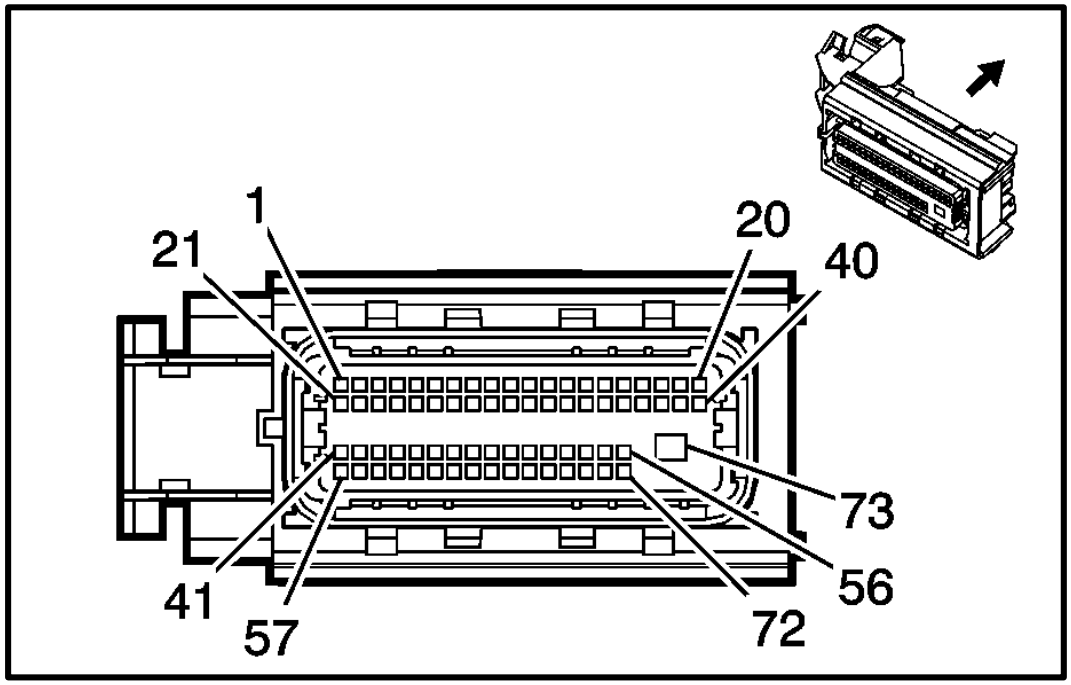
K20 Engine Control Module X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
1-2	-	-	-	Not Occupied
3	0.5	BK/L-GN	2919	Fuel Rail Pressure Sensor Low Reference
4	-	-	-	Not Occupied
5	0.5	GY/BK	3096	Output Speed (Digital) 5V Sensor Reference
6	0.5	VT/WH	821	Vehicle Speed Sensor Signal
7	0.5	BK/L-GN	822	Vehicle Speed Sensor Low Reference

K20 Engine Control Module X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
8	0.5 0.5	BN/WH L-GN	6354 3098	Output Speed High (Replicated TOS) Input Signal Output Speed (Digital) Signal
9	-	-	-	Not Occupied
10	0.5	VT/GY	3110	Heated Oxygen Sensor High Signal Bank 1 Sensor (1)
11	0.5	VT/WH	3210	Heated Oxygen Sensor High Signal Bank 2 Sensor (1)
12	0.5	VT/D-BU	3120	Heated Oxygen Sensor High Signal Bank 1 Sensor (2)
13	0.5	VT/L-GN	3220	Heated Oxygen Sensor High Signal Bank 2 Sensor (2)
14	-	-	-	Not Occupied
15	0.5	GY/D-BU	7564	Humidity Sensor Signal
16	0.5	BN/WH	582	Throttle Actuator Control Close
17	-	-	-	Not Occupied
18	0.5	BN/RD	2917	Fuel Rail Pressure Sensor (5) Volt Reference
19	0.5	D-BU/WH	2918	Fuel Rail Pressure Sensor Signal
20	-	-	-	Not Occupied
21	0.5	WH/BK	3097	Output Speed (Digital) 5V Sensor Return
22	-	-	-	Not Occupied
23	0.5	L-GN/WH	5007	Reverse Switch Signal
24-25	-	-	-	Not Occupied
26	0.5	WH/BK	3111	Heated Oxygen Sensor Low Signal Bank 1 Sensor (1)
27	0.5	YE/WH	3211	Heated Oxygen Sensor Low Signal Bank 2 Sensor (1)
28	0.5	WH/YE	3121	Heated Oxygen Sensor Low Signal Bank 1 Sensor (2)
29	0.5	YE/D-BU	3221	Heated Oxygen Sensor Low Signal Bank 2 Sensor (2)
30-31	-	-	-	Not Occupied

K20 Engine Control Module X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
32	0.5	YE	581	Throttle Actuator Control Open
33	-	-	-	Not Occupied
34	0.5	BN/RD	2701	Throttle Position Sensor 5 Volt Reference
35	-	-	-	Not Occupied
36	0.75	VT/GY	496	Knock Sensor Signal (1)
37	0.75	WH/GY	1876	Knock Sensor Signal (2)
38-39	-	-	-	Not Occupied
40	0.5	VT/D-BU	6091	Crankshaft Position Sensor Replicated Signal
41	0.5	GY/WH	3113	Heated Oxygen Sensor Heater Low Control Bank 1 Sensor (1)
42	0.5	GY/WH	3122	Heated Oxygen Sensor Heater Low Control Bank 1 Sensor (2)
43	0.5	L-GN/WH	432	Manifold Absolute Pressure Sensor Signal
44	0.5	GY/RD	2704	Manifold Absolute Pressure Sensor 5 Volt Reference
45-48	-	-	-	Not Occupied
49	0.5	WH/D-BU	6289	Induction Air Temperature Sensor Signal
50	-	-	-	Not Occupied
51	0.5	L-GN/D-BU	428	EVAP Canister Purge Solenoid Control
52	0.5	L-GN/WH	492	Mass Air Flow Sensor Signal
53	0.5	BN	25	Charge Indicator Control
54	0.5	BK/BN	2752	Throttle Position Sensor Low Reference
55	0.5	GY	23	Generator Field Duty Cycle Signal
56	0.75	BK/YE	1716	Knock Sensor Low Reference (1)
57	0.75	BK/GY	2303	Knock Sensor Low Reference (2)
58	0.5	WH/GY	1786	Transmission Park/Neutral Signal (1)
59	0.5	D-BU	179	Oil Pump Command Signal

K20 Engine Control Module X2				
Pin	**Size**	**Color**	**Circuit**	**Function**
60	0.5	BN/L-GN	1174	Oil Level Switch Signal
61	0.5	L-GN/YE	3212	Heated Oxygen Sensor Heater Low Control Bank 2 Sensor (1)
62	0.5	WH/BN	3223	Heated Oxygen Sensor Heater Low Control Bank 2 Sensor (2)
63	0.5	BK/L-GN	469	Manifold Absolute Pressure Sensor Low Reference
64	-	-	-	Not Occupied
65	0.5	BK/D-BU	61	Outside Ambient Temperature Sensor Low Reference
66-68	-	-	-	Not Occupied
69	0.5	WH/YE	3202	Throttle Inlet Absolute Pressure Sensor 5V Return
70	0.5	D-BU/WH	3630	Throttle Position Sensor (SENT1) Signal
71-72	-	-	-	Not Occupied
73	2.5	BK/WH	451	Signal Ground

K20 Engine Control Module (ECM) – Connector X3



K20 Engine Control Module (ECM) – Connector X3 Pin-outs

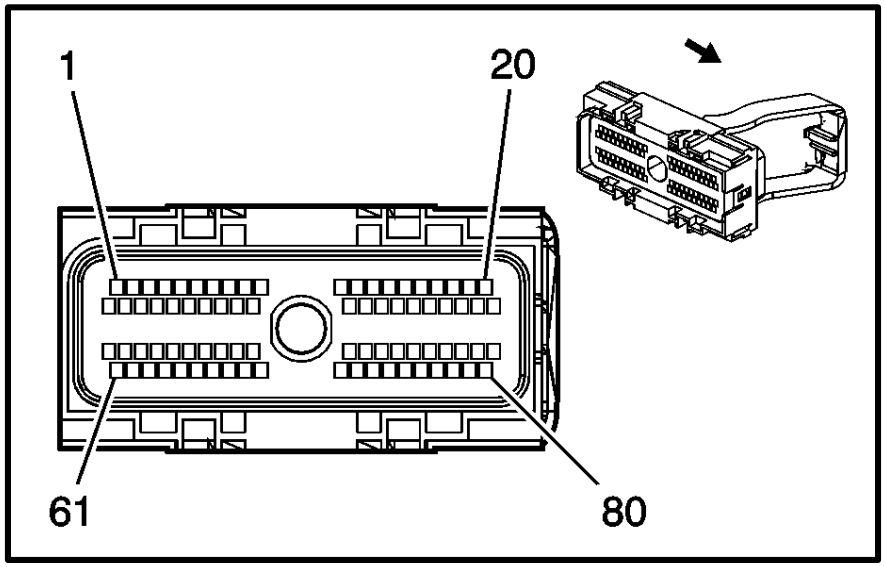
K20 Engine Control Module X3				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	0.5	YE/BN	331	Oil Pressure Sensor Signal
2	0.5	WH/RD	2705	Oil Pressure Sensor 5 Volt Reference
3	0.5	BN/YE	2161	Fuel Rail Pressure Sensor #2 Signal
4-7	-	-	-	Not Occupied
8	0.5	D-BU	410	Engine Coolant Temperature Sensor Signal
9	-	-	-	Not Occupied

K20 Engine Control Module X3				
Pin	**Size**	**Color**	**Circuit**	**Function**
10	0.5	VT/D-BU	6270	Crankshaft 60X Sensor Voltage
11	0.5	L-GN/D-BU	2123	Ignition Control (3)
12	0.5	YE/D-BU	2124	Ignition Control (4)
13	0.5	D-BU/WH	2122	Ignition Control (2)
	0.5	D-BU/GY	2125	Ignition Control (5)
14	0.5	L-GN/D-BU	2123	Ignition Control (3)
	0.5	BN/D-BU	2126	Ignition Control (6)
15	0.5	BK/GY	2130	Ignition Control Low Reference Bank 2
16	0.75	YE	7301	High Pressure Fuel Pump Actuator High - Control
17	0.5	BK/PU	2755	Oil Pressure Sensor Low Reference
18-23	-	-	-	Not Occupied
24	0.5	BK/BN	2761	Coolant Temperature Sensor Low Reference
25	0.5	BK/PU	6272	Crankshaft 60X Sensor Low Reference
26	0.5	L-GN	6271	Crankshaft 60X Sensor Signal
27	0.5	YE/D-BU	2124	Ignition Control (4)
	0.5	D-BU/WH	2122	Ignition Control (2)
28	0.5	D-BU/GY	2125	Ignition Control (5)
	0.5	L-GN/GY	2127	Ignition Control (7)
29	0.5	BN/D-BU	2126	Ignition Control (6)
	0.5	VT/WH	2128	Ignition Control (8)
30	0.5	D-BU/VT	2121	Ignition Control (1)

K20 Engine Control Module X3				
Pin	**Size**	**Color**	**Circuit**	**Function**
31	0.5	BK/D-BU	2129	Ignition Control Low Reference Bank 1
32	0.75	VT/BK	7300	High Pressure Fuel Pump Actuator Low - Control
33	0.5	YE/VT	5275	Camshaft Position Intake Sensor (1)
34	0.5	GY/D-BU	5300	Camshaft Position Intake Sensor Supply Voltage (1)
35-38	-	-	-	Not Occupied
39	0.5	VT/BN	5284	Camshaft Phaser Intake Solenoid (1)
40-42	-	-	-	Not Occupied
43	0.5	GY	5493	Cylinder Shutoff Solenoid Control (3)
44	0.5	YE/D-BU	5494	Cylinder Shutoff Solenoid Control (4)
45	0.75	GY/D-BU	4804	Direct Fuel Injector (DFI) High Voltage Control Cylinder 4
46	0.75	GY/D-BU	4804	Direct Fuel Injector (DFI) High Voltage Control Cylinder 4
	0.75	D-BU	4802	Direct Fuel Injector (DFI) High Voltage Control Cylinder 2
47	0.75	L-GN	4803	Direct Fuel Injector (DFI) High Voltage Control Cylinder 3
	0.75	PU/L-GN	4806	Direct Fuel Injector (DFI) High Voltage Control Cylinder 6
48	0.75	PU/L-GN	4806	Direct Fuel Injector (DFI) High Voltage Control Cylinder 6
	0.75	GY	4808	Direct Fuel Injector (DFI) High Voltage Control Cylinder 8
49	0.75	L-GN	4803	Direct Fuel Injector (DFI) High Voltage Control Cylinder 3
50	0.75	WH/L-GN	4805	Direct Fuel Injector (DFI) High Voltage Control Cylinder 5
	0.75	YE/GY	4807	Direct Fuel Injector (DFI) High Voltage Control Cylinder 7
51	0.75	D-BU	4802	Direct Fuel Injector (DFI) High Voltage Control Cylinder 2
	0.75	WH/L-GN	4805	Direct Fuel Injector (DFI) High Voltage Control Cylinder 5

K20 Engine Control Module X3				
Pin	**Size**	**Color**	**Circuit**	**Function**
52	0.75	BN	4801	Direct Fuel Injector (DFI) High Voltage Control Cylinder 1
53	0.5	BK/L-GN	5301	Camshaft Position Intake Sensor Low Reference (1)
54-58	-	-	-	Not Occupied
59	0.5	BK/BN	6753	Cam Phaser W Return Low Reference
60-62	-	-	-	Not Occupied
63	0.5	D-BU	5491	Cylinder Shutoff Solenoid Control (1)
64	0.5	L-GN	5492	Cylinder Shutoff Solenoid Control (2)
65	0.75	D-BU/WH	4904	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 4
66	0.75	D-BU/WH	4904	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 4
	0.75	D-BU/GY	4902	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 2
67	0.75	L-GN/GY	4903	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 3
	0.75	PU/GY	4906	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 6
68	0.75	PU/GY	4906	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 6
	0.75	GY/WH	4908	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 8
69	0.75	L-GN/GY	4903	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 3
70	0.75	L-GN/WH	4905	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 5
	0.75	WH/YE	4907	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 7
71	0.75	D-BU/GY	4902	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 2
	0.75	L-GN/WH	4905	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 5
72	0.75	BN/WH	4901	Direct Fuel Injector (DFI) High Voltage Supply Cylinder 1
73	2.5	BK/WH	451	Signal Ground

K71 Transmission Control Module (TCM) – Connector



K71 Transmission Control Module (TCM) – Connector X1 Pin-outs

K71 Transmission Control Module				
Pin	**Size**	**Color**	**Circuit**	**Function**
1	-	-	-	Not Occupied
2	0.5	VT/BK	2139	Run/Crank Ignition 1 Voltage
3-5	-	-	-	Not Occupied
6	0.5	BU	2500	High Speed GMLAN Serial Data (+) (1)
7-8	-	-	-	Not Occupied
9	0.75	BK/WH	451	Signal Ground
10	0.75	RD/GN	1840	Battery Positive Voltage

K71 Transmission Control Module				
Pin	**Size**	**Color**	**Circuit**	**Function**
11	0.75	YE	1228	Transmission Force Motor Supply Voltage (1)
12-13	-	-	-	Not Occupied
14	0.5	GY	773	Transmission Position Switch Bit 3 Signal
15-16	-	-	-	Not Occupied
17	0.75	VT/GY	1224	Transmission Fluid Pressure Switch Signal Bit 1
18-19	-	-	-	Not Occupied
20	0.5	BK/BU	1984	Transmission Turbine Speed Switch Low Reference
21-24	-	-	-	Not Occupied
25	0.5	BN/VT	6399	Replicated TOS Signal
26	-	-	-	Not Occupied
27	0.5	WH	2501	High Speed GMLAN Serial Data (-) (1)
28-32	-	-	-	Not Occupied
33	0.75	YE/BK	1223	2 Shift Solenoid Valve Control
34	0.5	WH	776	Transmission Position Switch Parity Bit Signal
35	-	-	-	Not Occupied
36	0.75	BN/BK	2469	Transmission Force Motor Return (2)
37-39	-	-	-	Not Occupied
40	0.5	BK/GN	822	Vehicle Speed Sensor Low Reference
41-42	-	-	-	Not Occupied
43	0.5	VT/YE	5985	Accessory Wakeup Serial Data
44-46	-	-	-	Not Occupied
47	0.5	WH	2501	High Speed GMLAN Serial Data (-) (1)
48-50	-	-	-	Not Occupied
51	0.75	WH/BN	2527	Shift Solenoid Control (5)

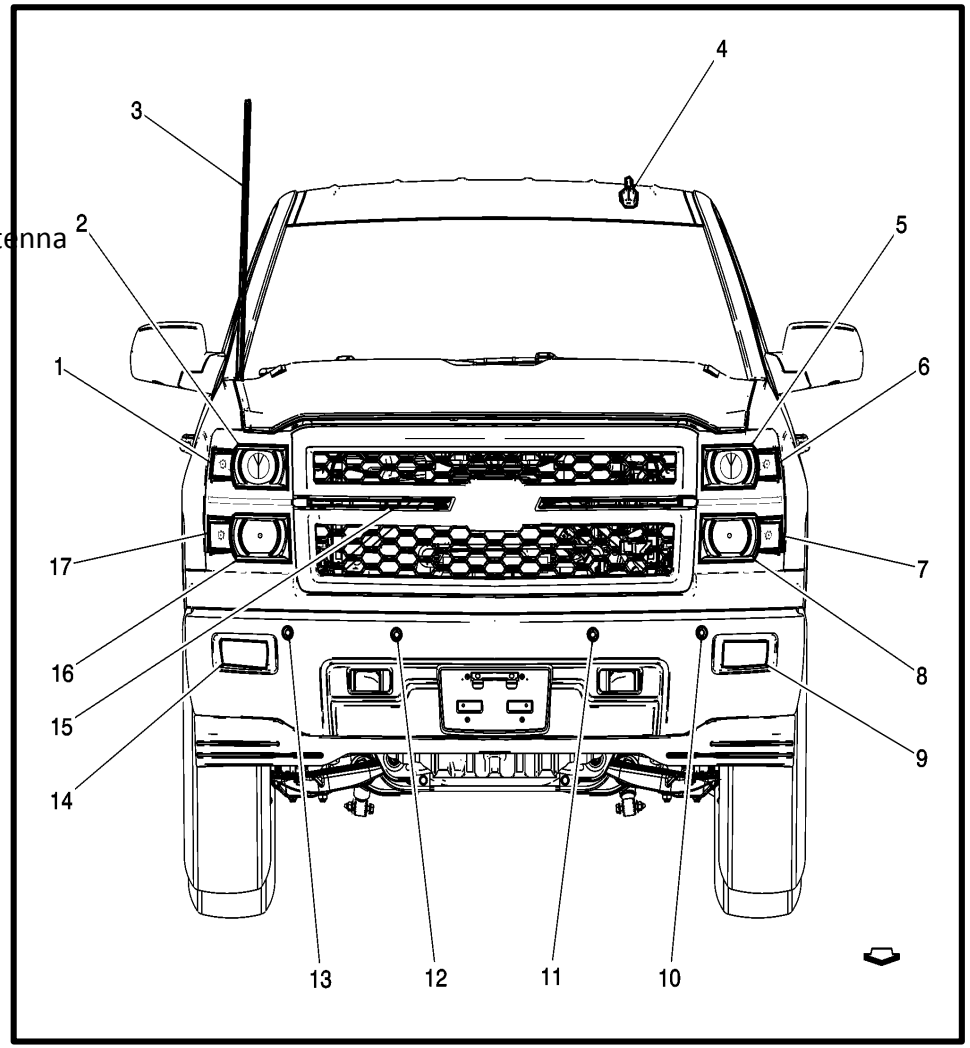
K71 Transmission Control Module				
Pin	**Size**	**Color**	**Circuit**	**Function**
52	0.75	WH/GN	1222	1 Shift Solenoid Valve Control
53	0.5	YE	772	Transmission Position Switch Bit 2 Signal
54	0.75	YE/BK	1227	Transmission Temperature Sensor Signal
55	0.75	VT/BK	1229	Transmission Force Motor Return (1)
56	-	-	-	Not Occupied
57	0.75	WH/BN	1226	Transmission Fluid Pressure Switch Signal Bit 3
58	0.75	BK/BU	2762	Transmission Fluid Temperature Sensor Low Reference
59	-	-	-	Not Occupied
60	0.5	VT/WH	821	Vehicle Speed Sensor Signal
61-62	-	-	-	Not Occupied
63	0.5	VT/BK	2139	Run/Crank Ignition 1 Voltage
64-65	-	-	-	Not Occupied
66	0.5	BU	2500	High Speed GMLAN Serial Data (+) (1)
67-68	-	-	-	Not Occupied
69	0.75	BK/WH	451	Signal Ground
70	0.75	RD/GN	1840	Battery Positive Voltage
71	0.75	BN/VT	323	Shift Solenoid Supply Voltage
72	-	-	-	Not Occupied
73	0.5	BN/WH	771	Transmission Position Switch Bit 1 Signal
74	0.75	GN/WH	1530	Transmission Mainline Pressure Solenoid Control
75-76	-	-	-	Not Occupied
77	0.75	GN/BK	2529	Transmission Fluid Pressure Switch Signal Bit 4
78	0.75	BN/VT	418	Torque Converter Clutch PWM Solenoid Control
79	0.75	GN/VT	1225	Transmission Fluid Pressure Switch Signal Bit 2

K71 Transmission Control Module				
Pin	**Size**	**Color**	**Circuit**	**Function**
80	0.5	WH/BK	1983	Transmission Turbine Speed Switch Signal

Component Locations

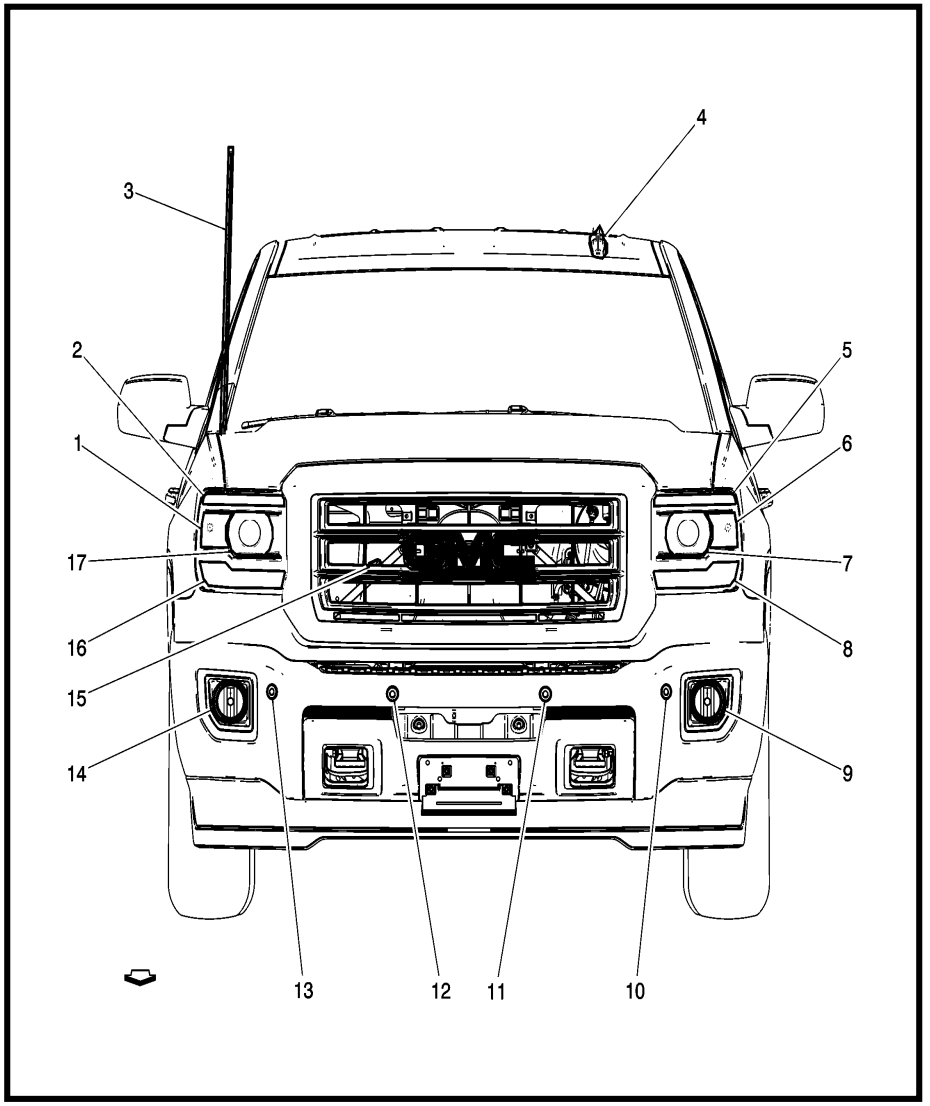
Front of Vehicle - Chevrolet

(1) E4T Park/Turn Signal Lamp – Right Upper (X88)
(2) E4H Headlamp – Right Low Beam
(3) T4E Cellular Phone and Navigation Antenna
(4) T4G Cellular Phone, Navigation and Digital Radio Antenna
(5) E4G Headlamp – Left Low Beam
(6) E4S Park/Turn Signal Lamp – Left Upper (X88)
(7) E4Q Park/Turn Signal Lamp – Left Lower (X88)
(8) E4E Headlamp – Left High Beam (X88)
(9) E29LF Fog Lamp – Left Front (T3U)
(10) B78A Front Object Sensor – Left Outer (UD5)
(11) B78C Front Object Sensor – Left Middle (UD5)
(12) B78D Front Object Sensor – Right Middle (UD5)
(13) B78B Front Object Sensor – Right Outer (UD5)
(14) E29RF Fog Lamp – Right Front (T3U)
(15) B9 Ambient Air Temperature Sensor
(16) E4F Headlamp – Right High Beam (X88)

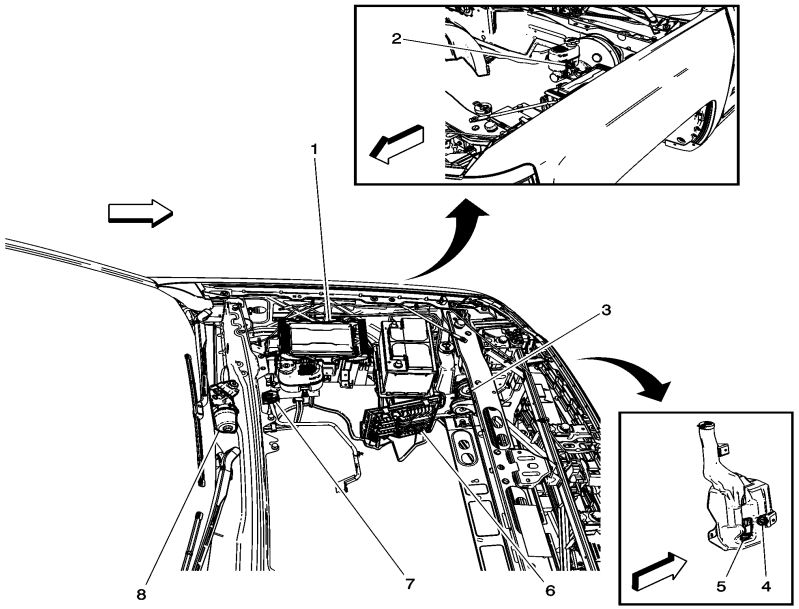


Front of Vehicle - GMC

(1) E4P Park/Turn Signal Lamp – Right (Z88)
(2) E4J Park Lamp – Left Front
(3) T4E Cellular Phone and Navigation Antenna
(4) T4G Cellular Phone, Navigation and Digital Radio Antenna
(5) E4K Park Lamp – Right Front
(6) E4G Headlamp – Left Low Beam
(7) E4N Park/Turn Signal Lamp – Left (Z88)
(8) E4D Daytime Running Lamp – Right (Y91)
(9) E29LF Fog Lamp – Left Front (T3U)
(10) B78A Front Object Sensor – Left Outer (UD5)
(11) B78C Front Object Sensor – Left Middle (UD5)
(12) B78D Front Object Sensor – Right Middle (UD5)
(13) B78A Front Object Sensor – Left Outer (UD5)
(14) E29RF Fog Lamp – Right Front (T3U)
(15) B9 Ambient Air Temperature Sensor
(16) E4C Daytime Running Lamp – Left (Y91)
(17) E4H Headlamp – Right Low Beam

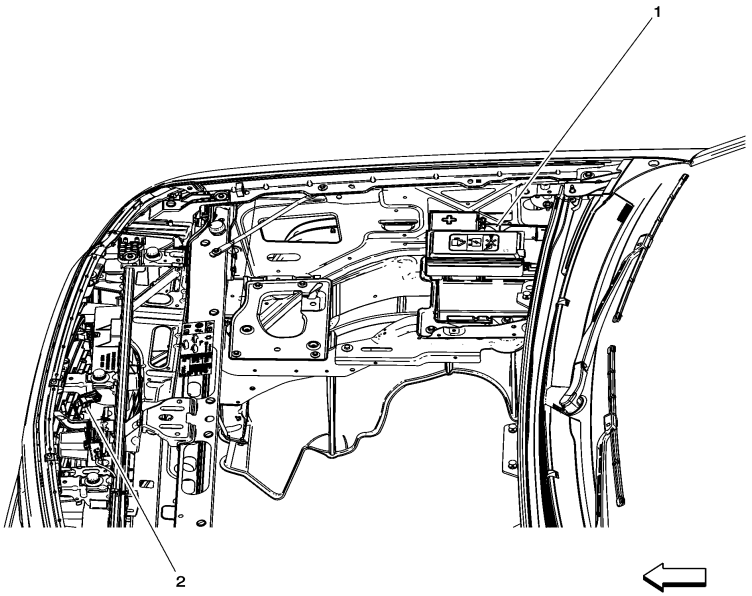


Left Side of Engine Compartment Components



(1) X50A Fuse Block – Under hood
(2) B20 Brake Fluid Level Switch
(3) P12 Horn
(4) B118B Windshield Washer Fluid Level Switch
(5) G24 Windshield Washer Pump
(6) K20 Engine Control Module
(7) B19B Brake Booster Vacuum Sensor
(8) M75 Windshield Wiper Motor

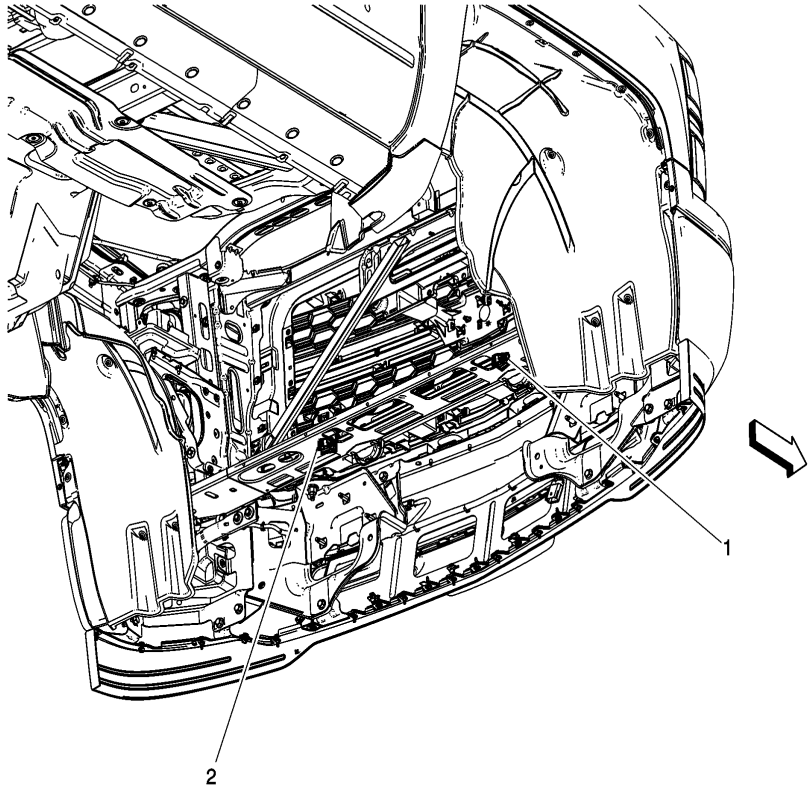
Right Side of Engine Compartment Components



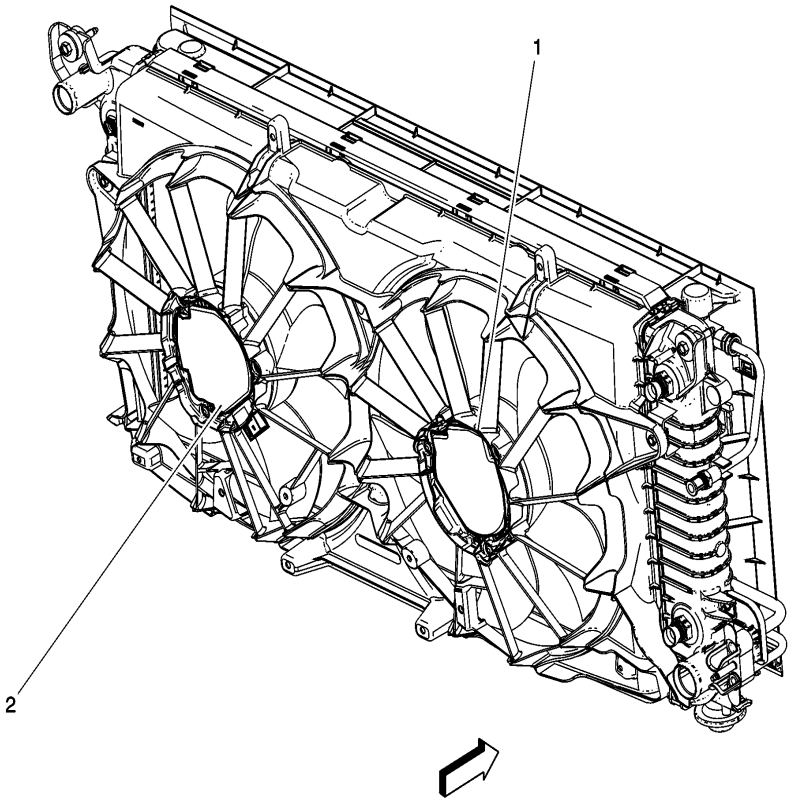
(1) C1 Battery

(2) B55 Hood Ajar Switch

Underside of Engine Compartment & Cooling Fans

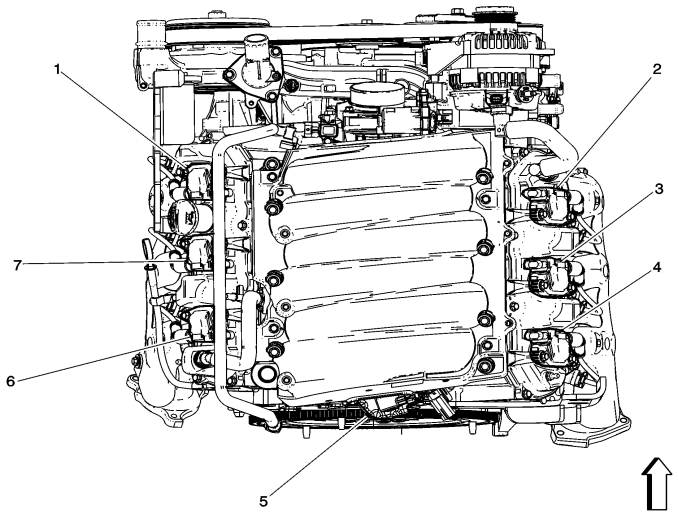


(1) B59R Front Impact Sensor – Right
(2) B59L Front Impact Sensor – Left



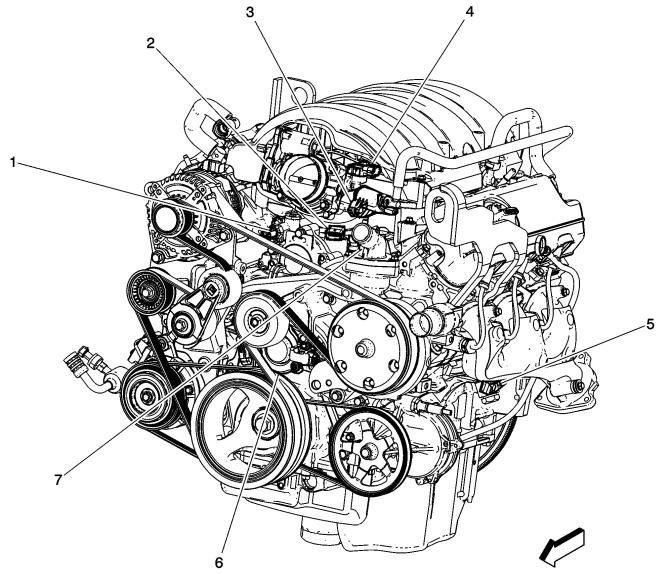
(1) G10R Cooling Fan Motor – Right
(2) G10L Cooling Fan Motor – Left

Engine Component Views (Top & Left Front)



Top of Engine

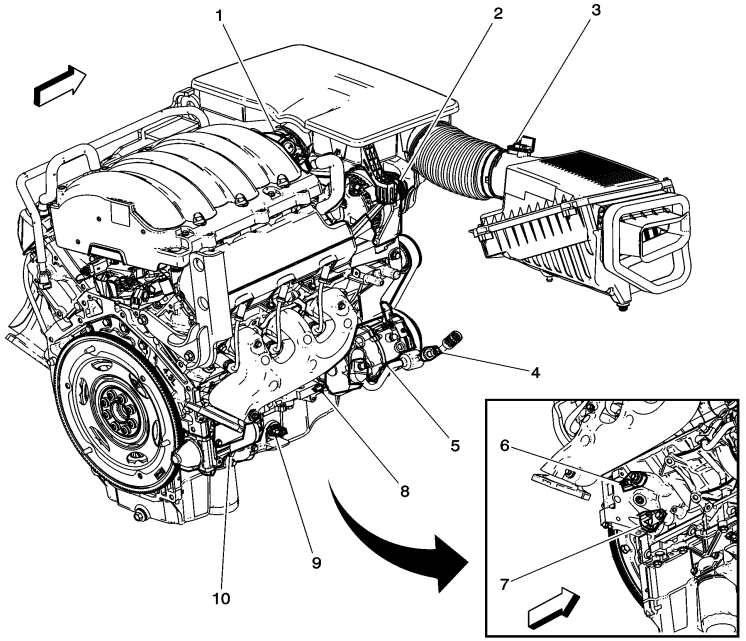
(1) T8A Ignition Coil 1
(2) T8B Ignition Coil 2
(3) T8D Ignition Coil 4
(4) T8F Ignition Coil 6
(5) G18 High Pressure Fuel Pump
(6) T8E Ignition Coil 5
(7) T8C Ignition Coil 3



Left Front of Engine

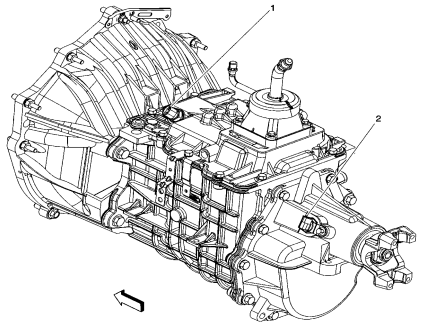
(1) B37B Engine Oil Pressure Sensor
(2) Q43 Valve Lifter Oil Manifold Assembly
(3) Q12 Evaporative Emission Purge Solenoid Valve
(4) B74 Manifold Absolute Pressure Sensor
(5) B68A Knock Sensor 1
(6) Q6 Camshaft Position Actuator Solenoid Valve
(7) B34 Engine Coolant Temperature Sensor

Engine Component Views (Right Rear, Manual Transmission & Transfer Case)



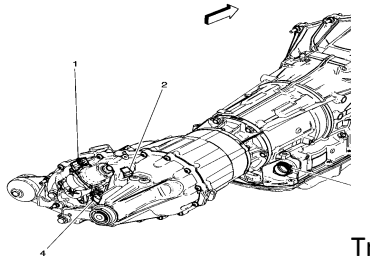
(1) Q38 Throttle Body
(2) G13 Generator
(3) B75C Multifunction Intake Air Sensor
(4) B1 A/C Refrigerant Pressure Sensor
(5) Q2 A/C Compressor Clutch
(6) B68B Knock Sensor 2
(7) B26 Crankshaft Position Sensor
(8) Q46 A/C Compressor Solenoid Valve
(9) B35 Engine Oil Level Switch
(10) M64 Starter Motor

Manual Transmission



(1) B16 Backup Lamp Switch

(2) B14A Transmission Output Shaft Speed Sensor



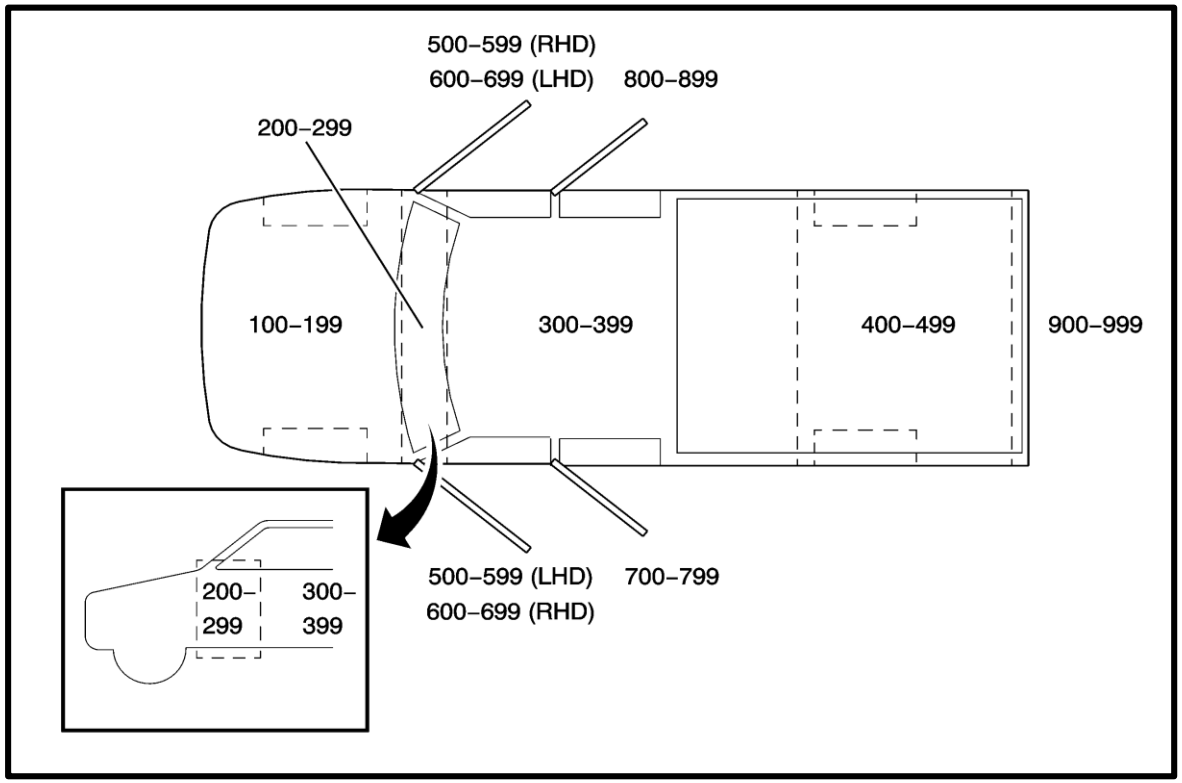
Transfer Case

(1) B227 Gear Position Sensor
(2) A16 Transfer Case Motor
(3) Q8 Control Solenoid Valve Assembly
(4) B14A Transmission Output Shaft Speed Sensor

Section D

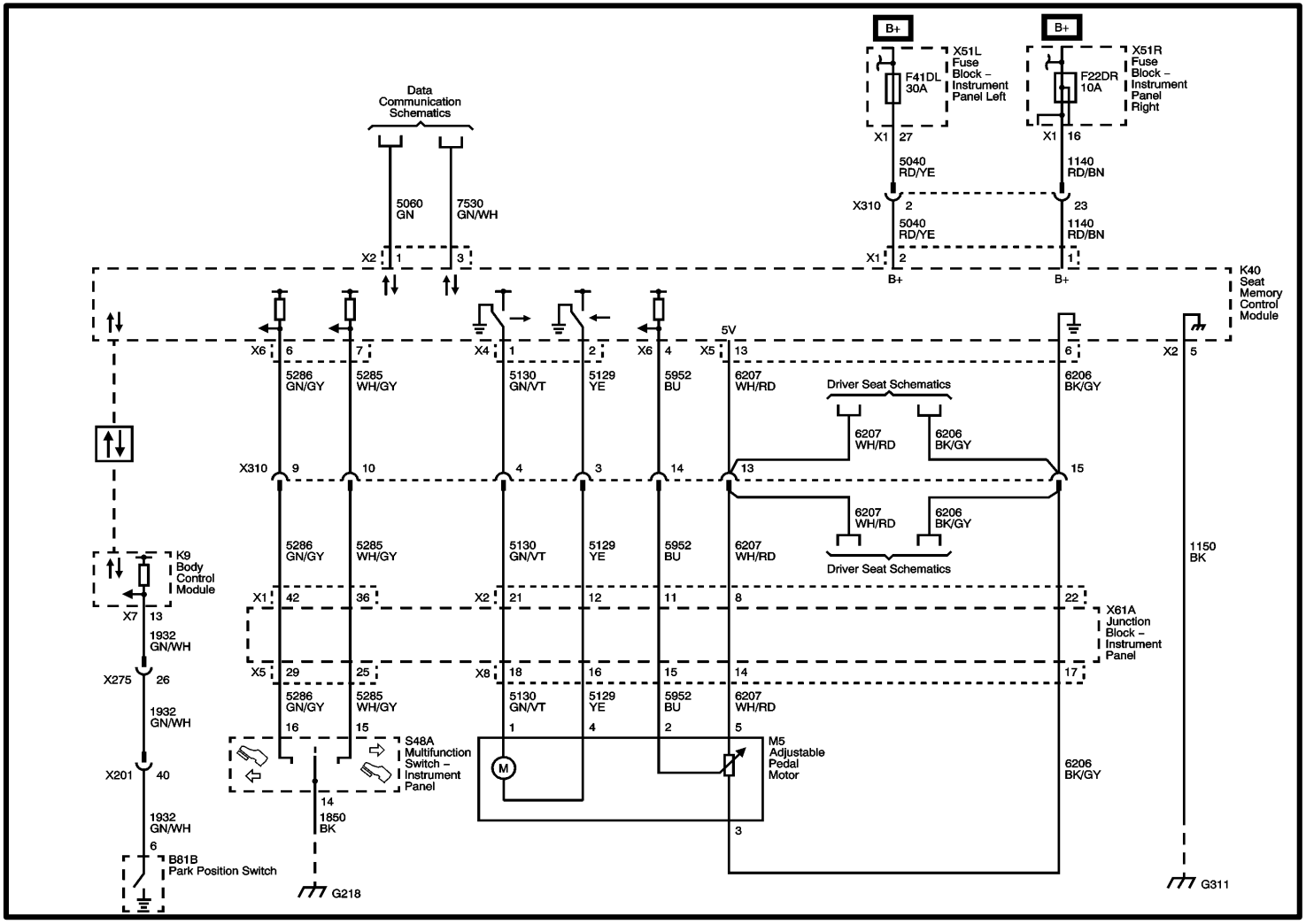
Electrical System - Vehicle Zoning Strategy

All grounds, in-line connectors, and splices have identifying numbers that correspond to where they are located in the vehicle. The following table explains the numbering system.

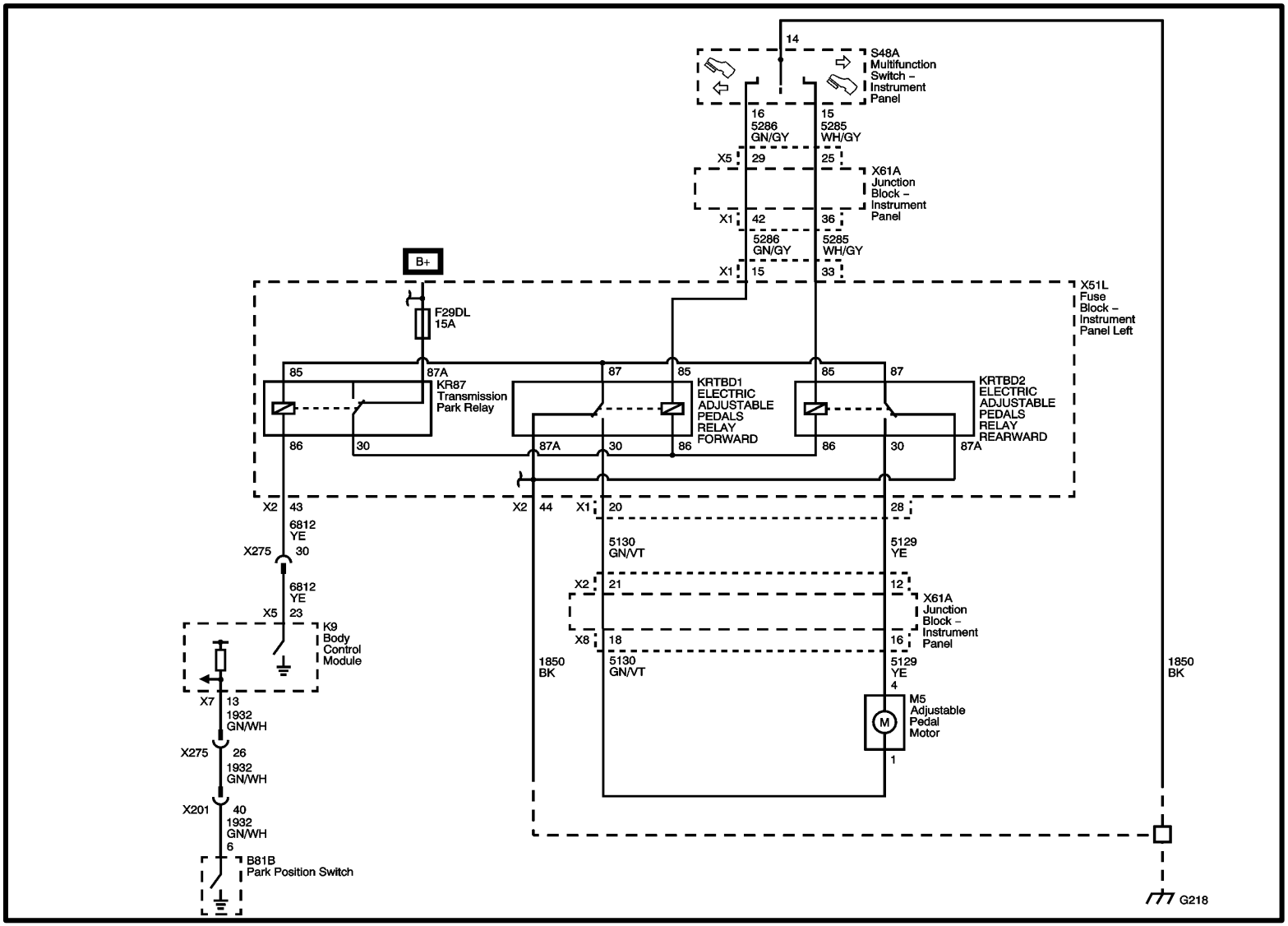


Vehicle Zoning Strategy	
Callout Numbers	**Zone Description**
100-199	Engine compartment (all forward of the instrument panel)
200-299	Within the instrument panel area (between the bulkhead and the front plane of the instrument panel)
300-399	Passenger compartment (from the instrument panel to the rear of the cab)
400-499	Truck bed/chassis (from the rear of the cab to the rear of the vehicle)
500-599	Inline harness connectors to or within the driver door
600-699	Inline harness connectors to or within the front passenger door
700-799	Inline harness connectors to or within the left rear door
800-899	Inline harness connectors to or within the right rear door
900-999	Inline harness connectors to or within the end/tailgate

Adjustable Pedals (With A45)

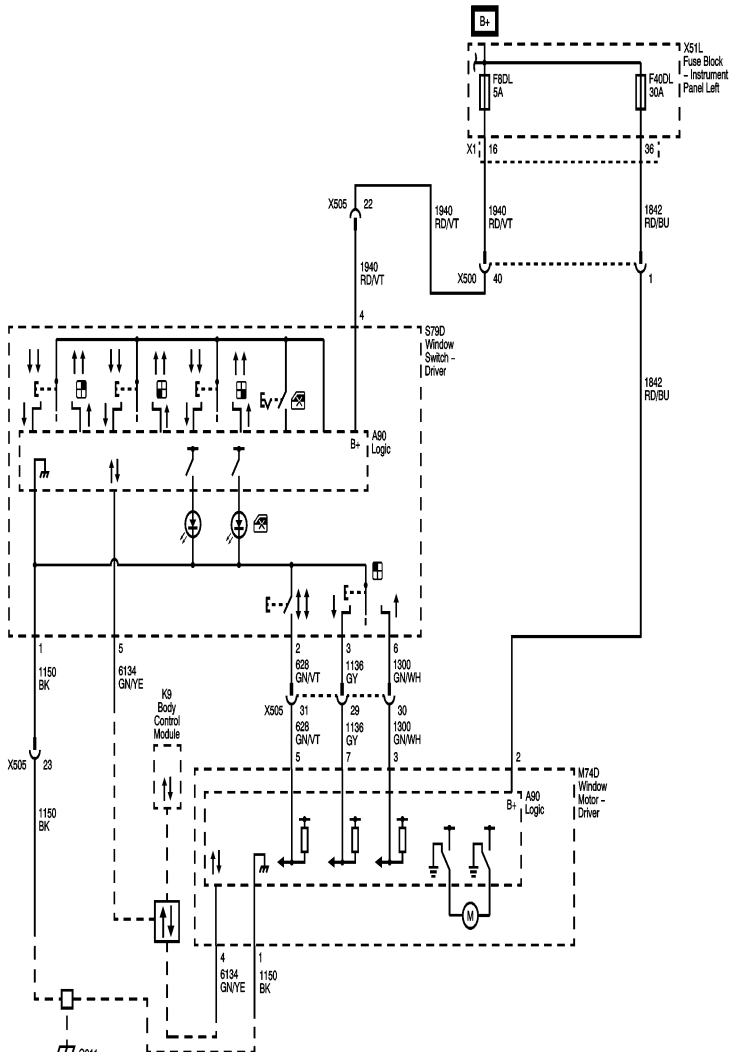


Adjustable Pedals (Without A45)

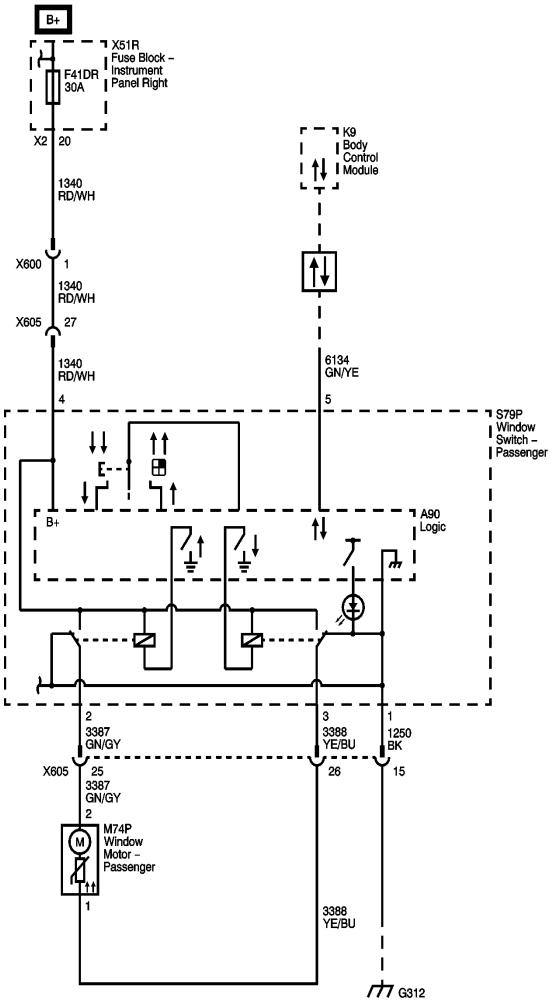

14
S48A Multifunction Switch – Instrument Panel
16 5286 GN/GY
15 5285 WH/GY
X5 29 25
X61A Junction Block – Instrument Panel
X1 42 36
5286 GN/GY
5285 WH/GY
X1 15 33
B+
F29DL 15A
X51L Fuse Block – Instrument Panel Left
85 87A KR87 Transmission Park Relay 86 30
87 85 KRTBD1 ELECTRIC ADJUSTABLE PEDALS RELAY FORWARD 87A 30 86
85 87 KRTBD2 ELECTRIC ADJUSTABLE PEDALS RELAY REARWARD 86 30 87A
X2 43 6812 YE X275 30 6812 YE X5 23
K9 Body Control Module
X7 13 1932 GN/WH X275 26 1932 GN/WH X201 40 1932 GN/WH 6
B81B Park Position Switch
X2 44 X1 20 28
5130 GN/VT
5129 YE
X2 21 12
X61A Junction Block – Instrument Panel
X8 18 16
1850 BK
5130 GN/VT
5129 YE 4
M5 Adjustable Pedal Motor
1
1850 BK
G218

Fixed and Moveable Windows –Front Doors

Driver Door

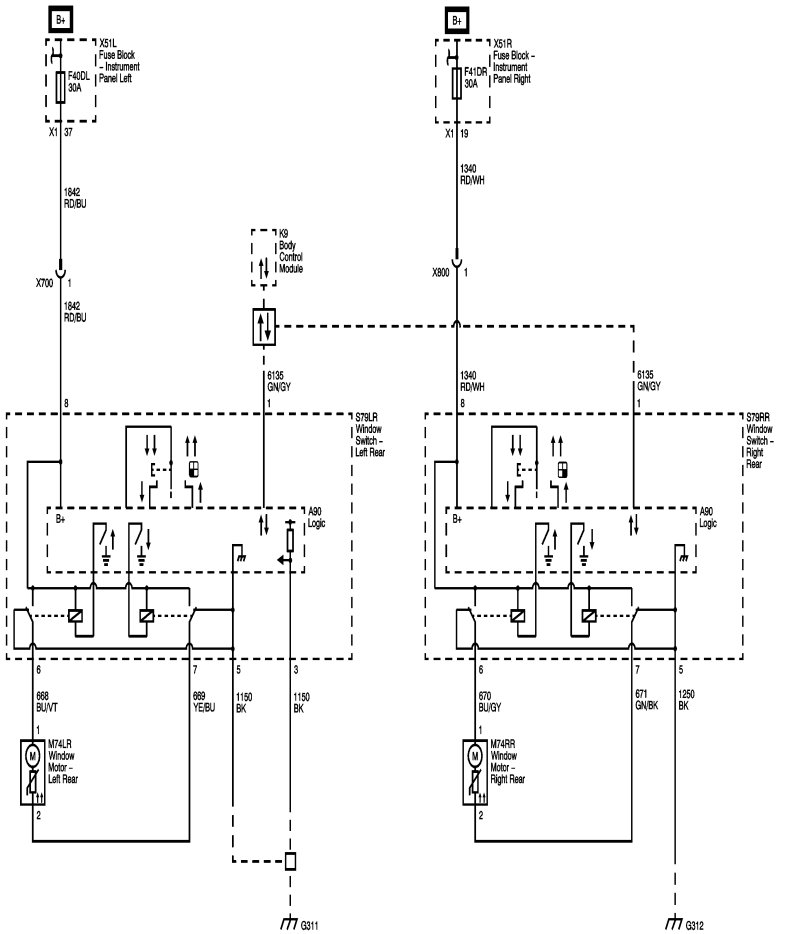


Passenger Door

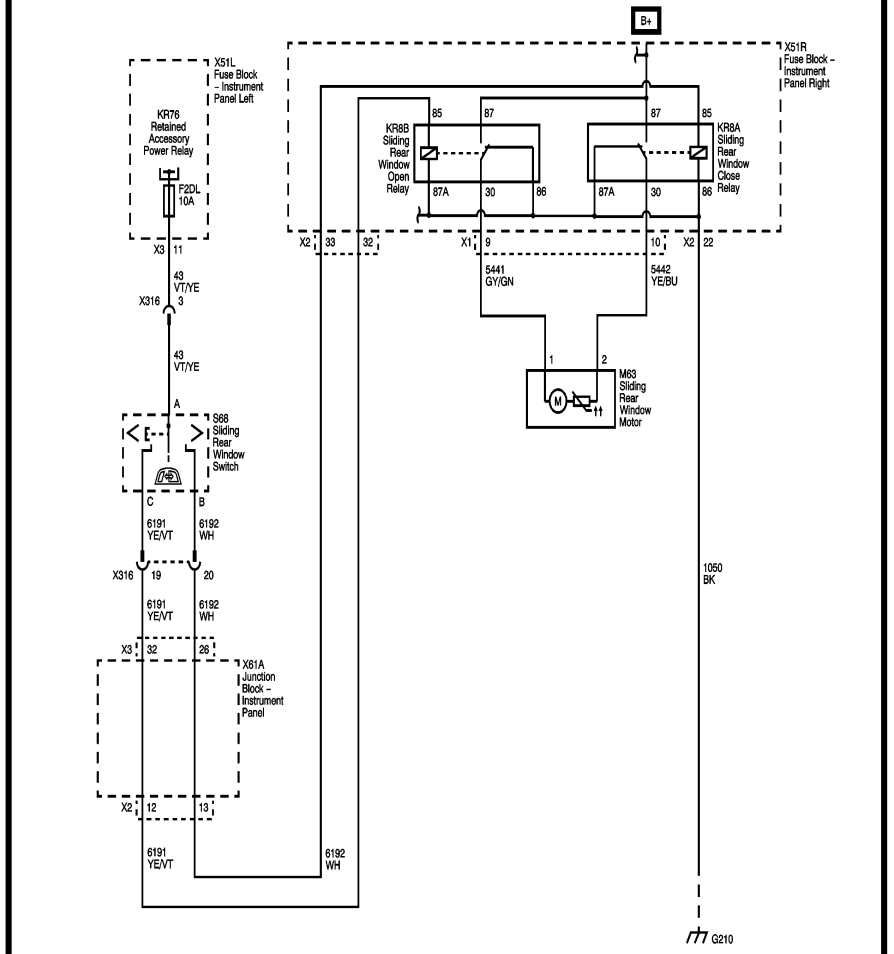


Fixed and Moveable Windows – Rear Doors & Rear Sliding Window

Rear Doors

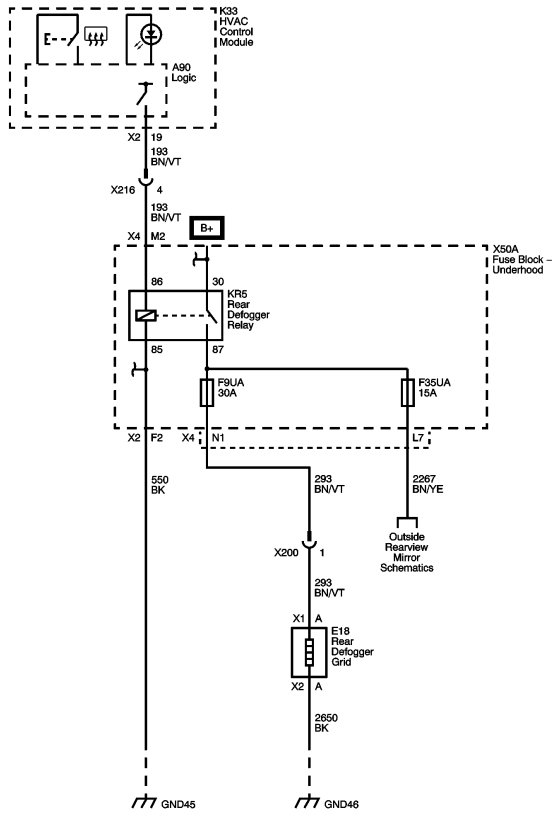


Rear Sliding Window

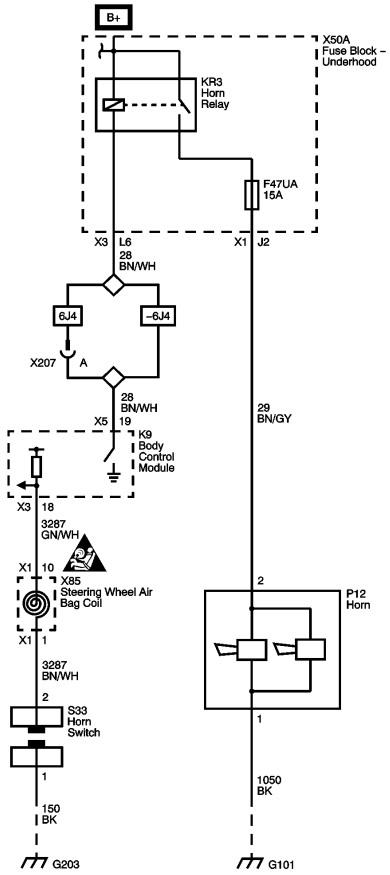


Rear Defogger/Horns

Rear Defogger

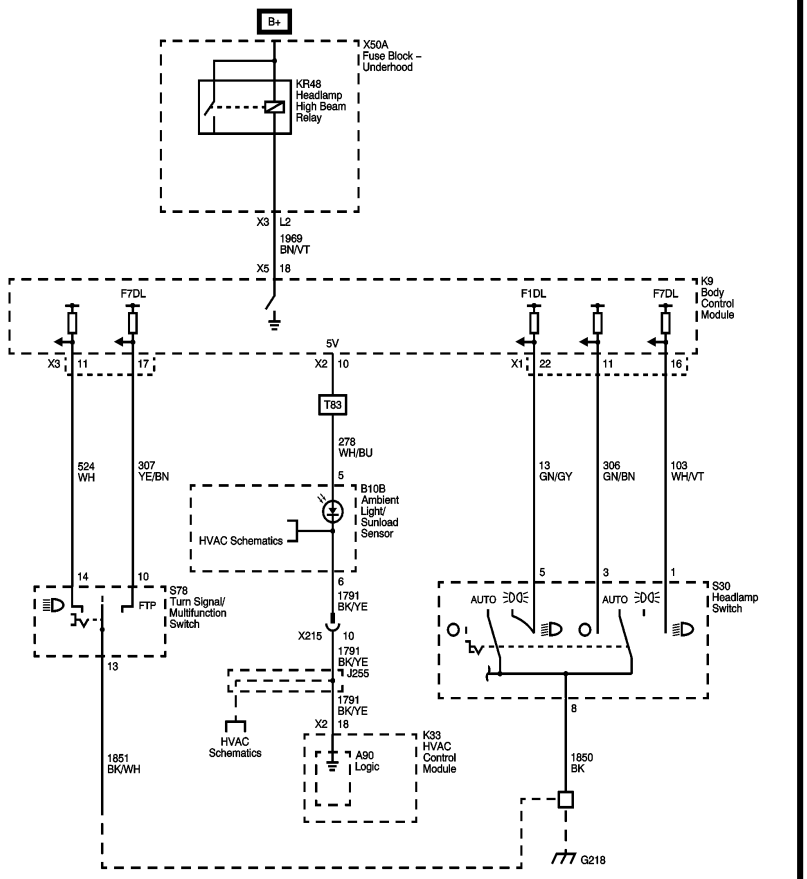


Horns

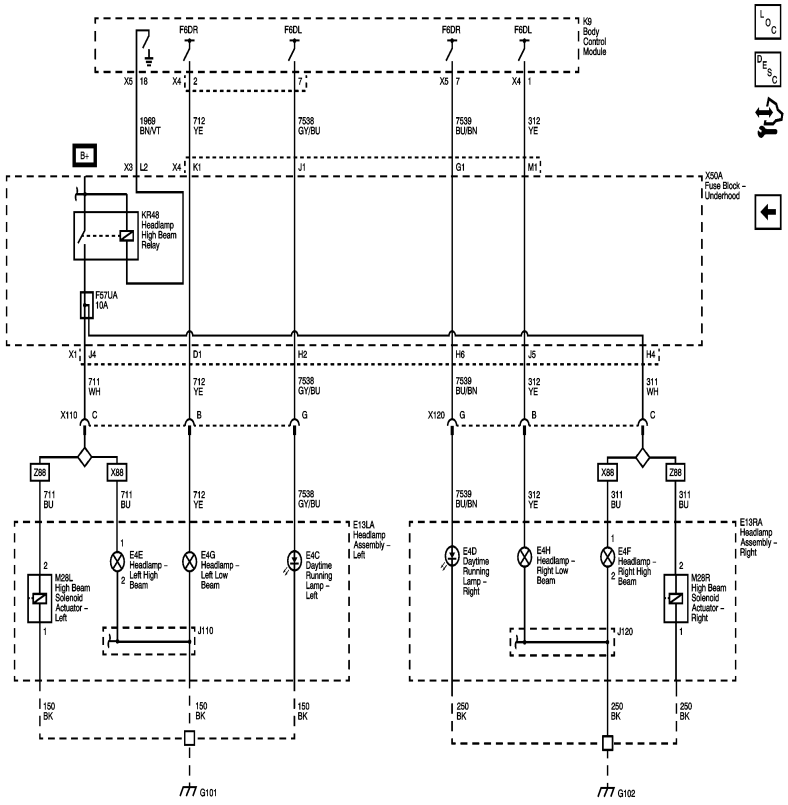


Exterior Lighting - Headlights/Daytime Running Lights (DRL)

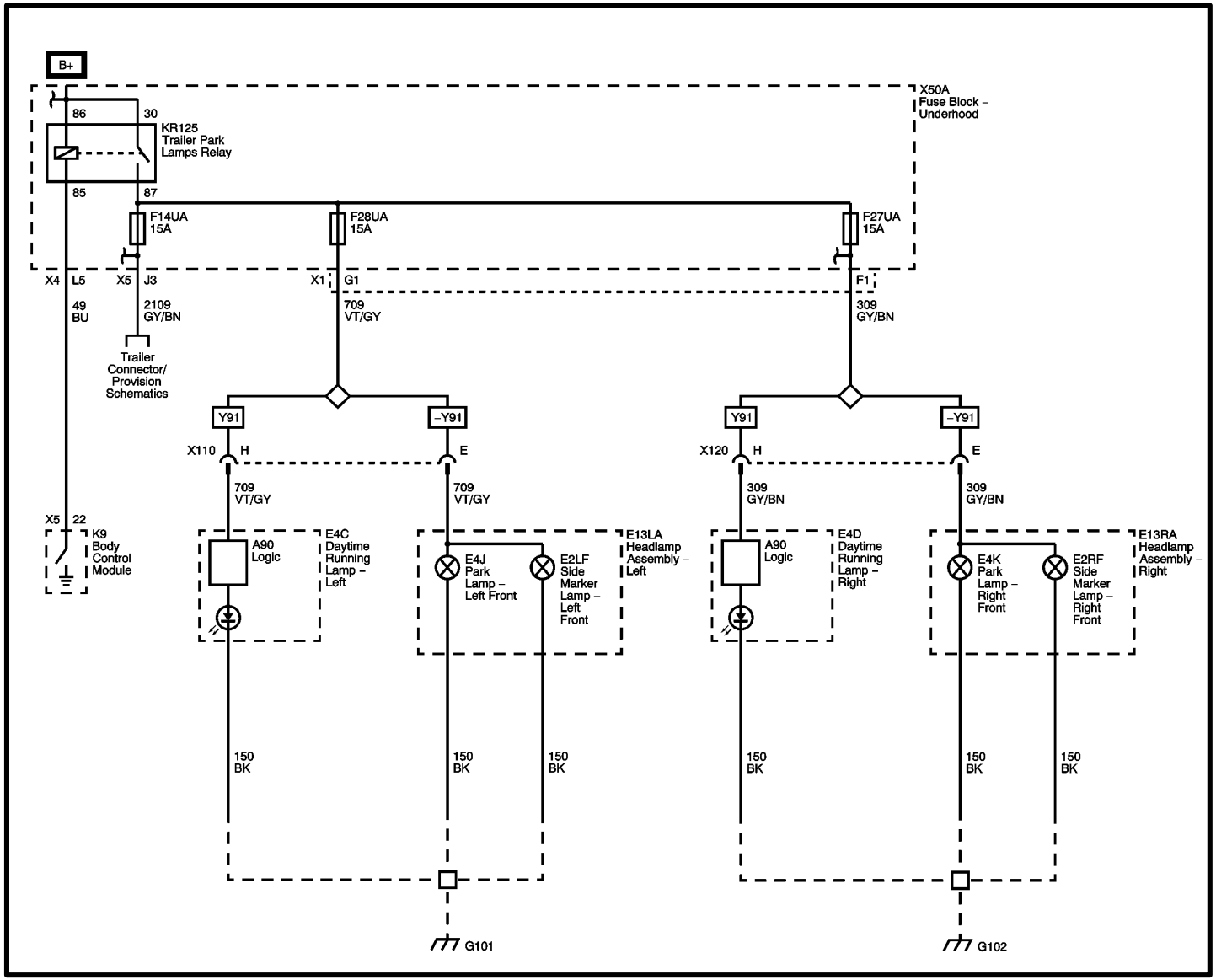
Controls



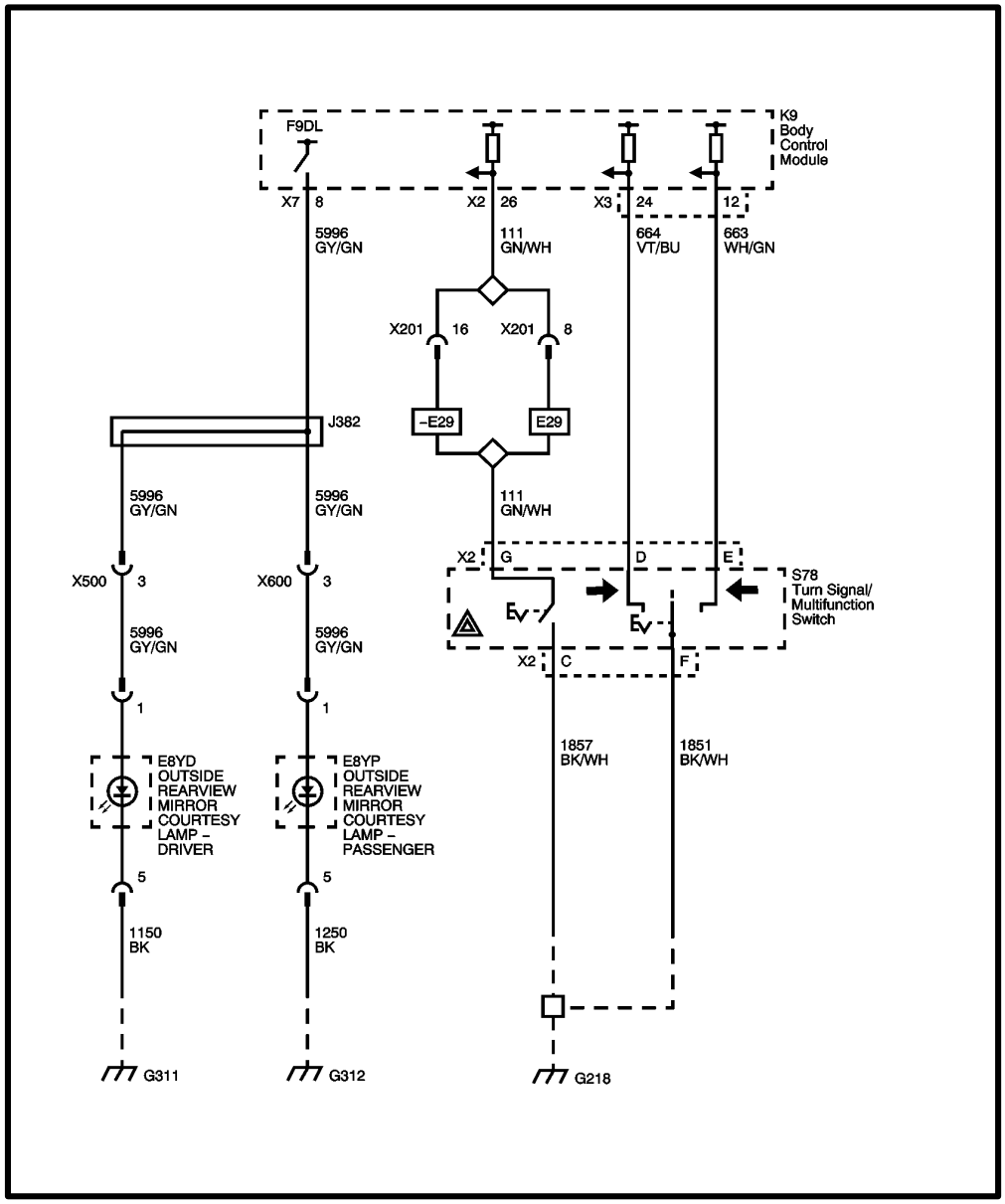
Headlamps



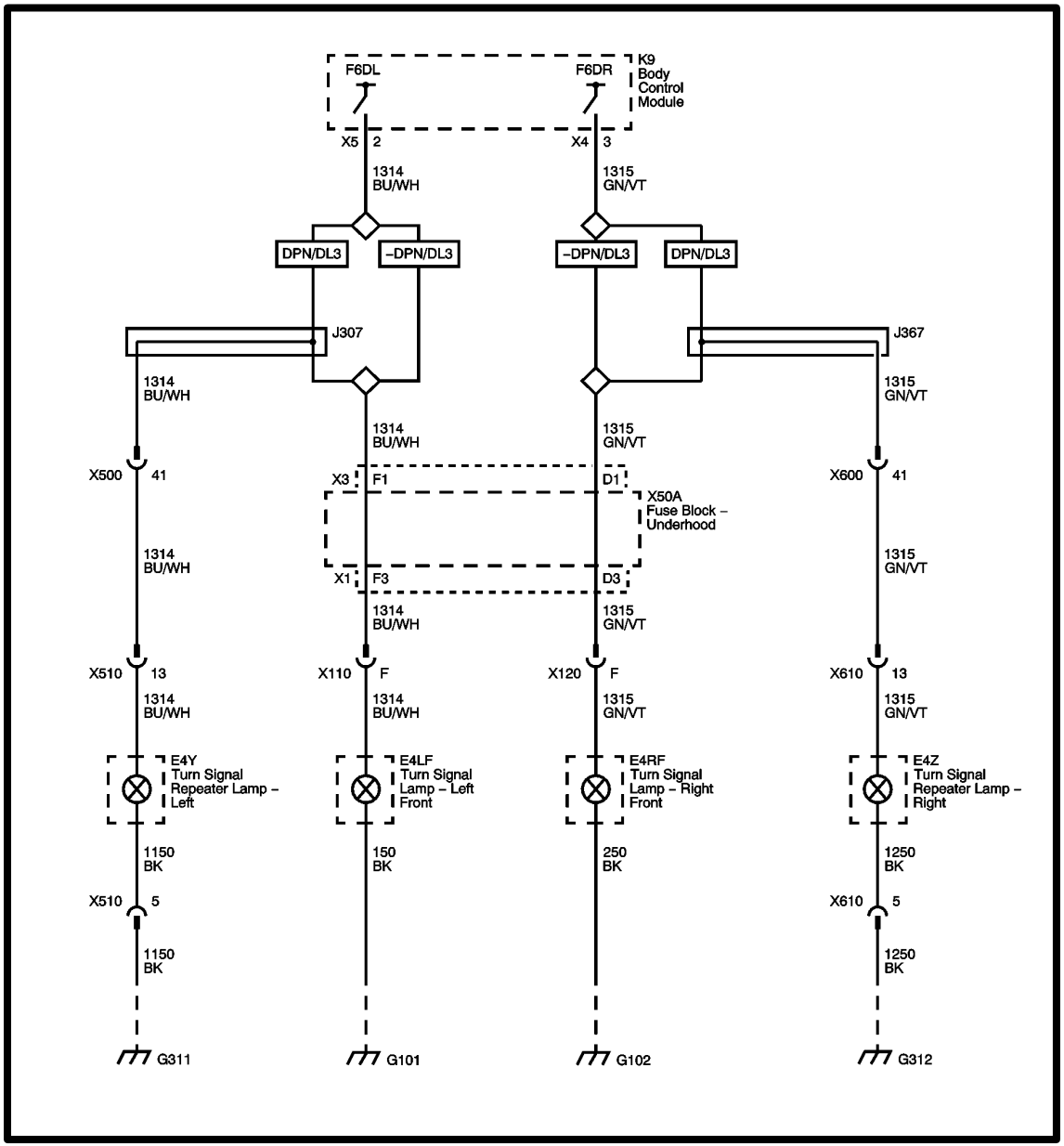
Exterior Lighting – Park Lamps and Controls



Exterior Lighting – Outside Mirror Lamps and Controls

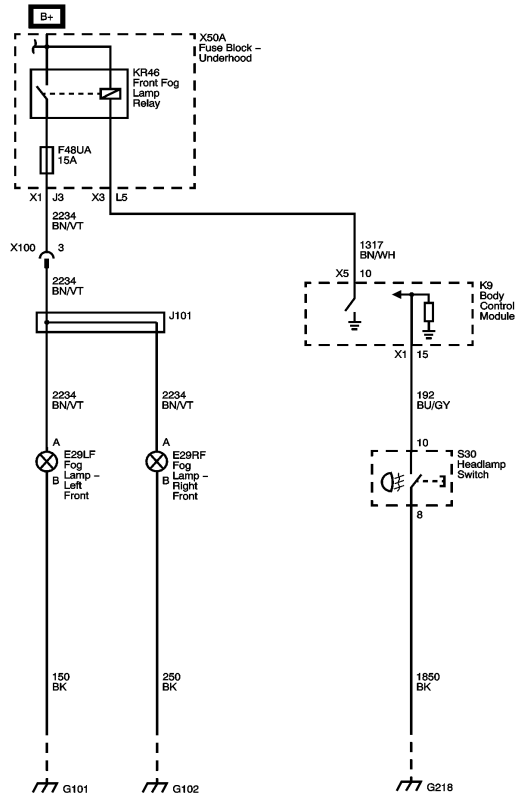


Exterior Lighting – Turn Signal Lamps

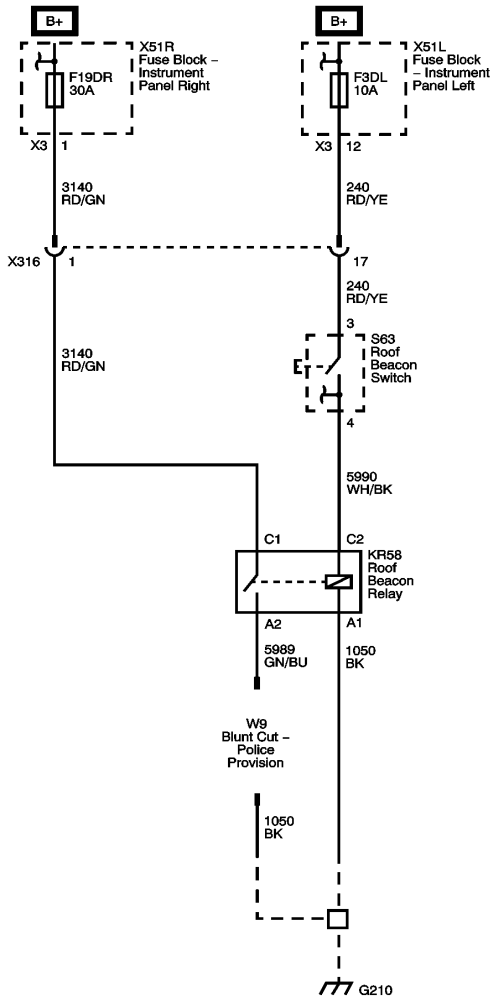


Exterior Lighting – Fog Lamps and Roof Lighting

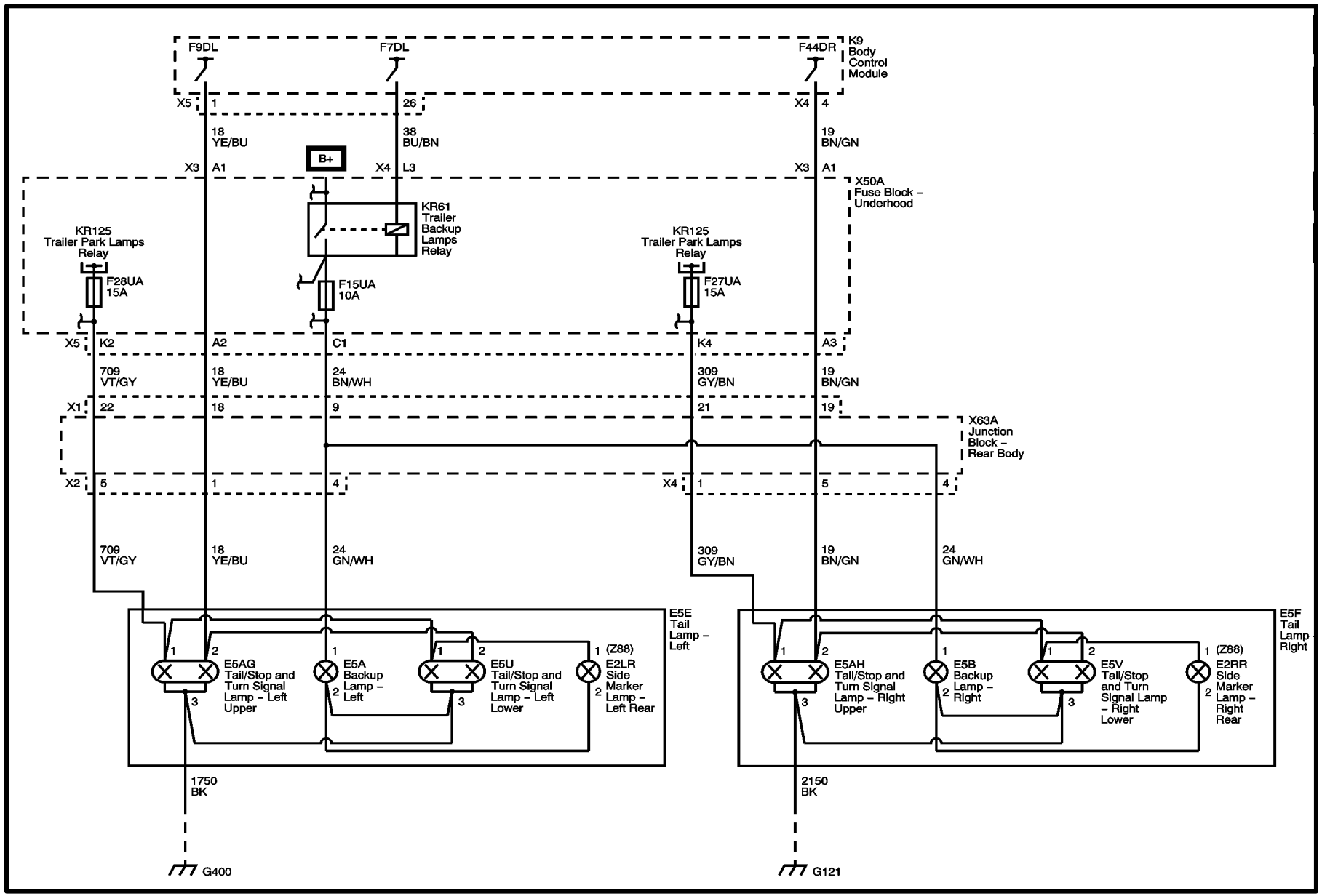
Fog Lamps



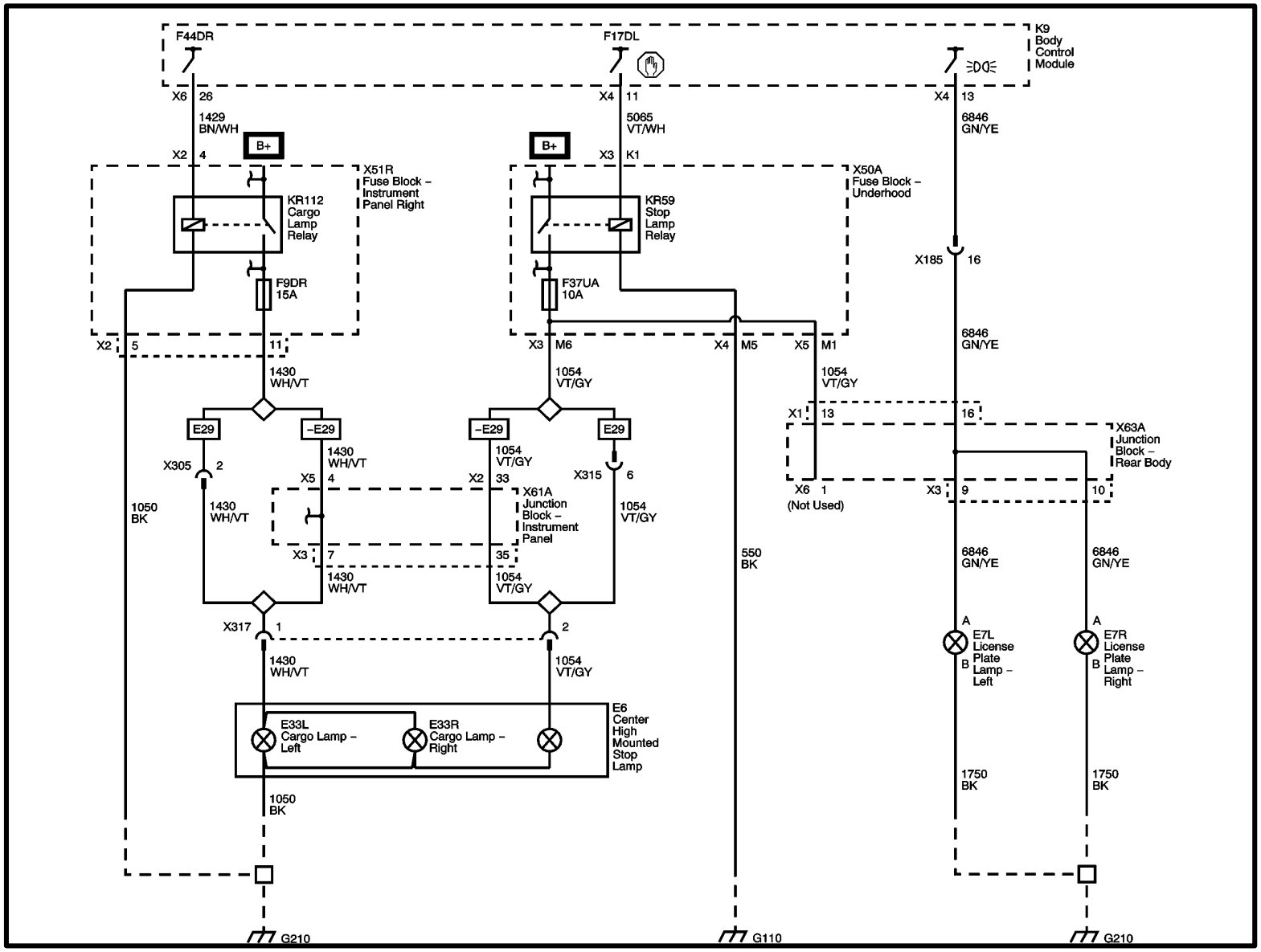
Roof Lighting



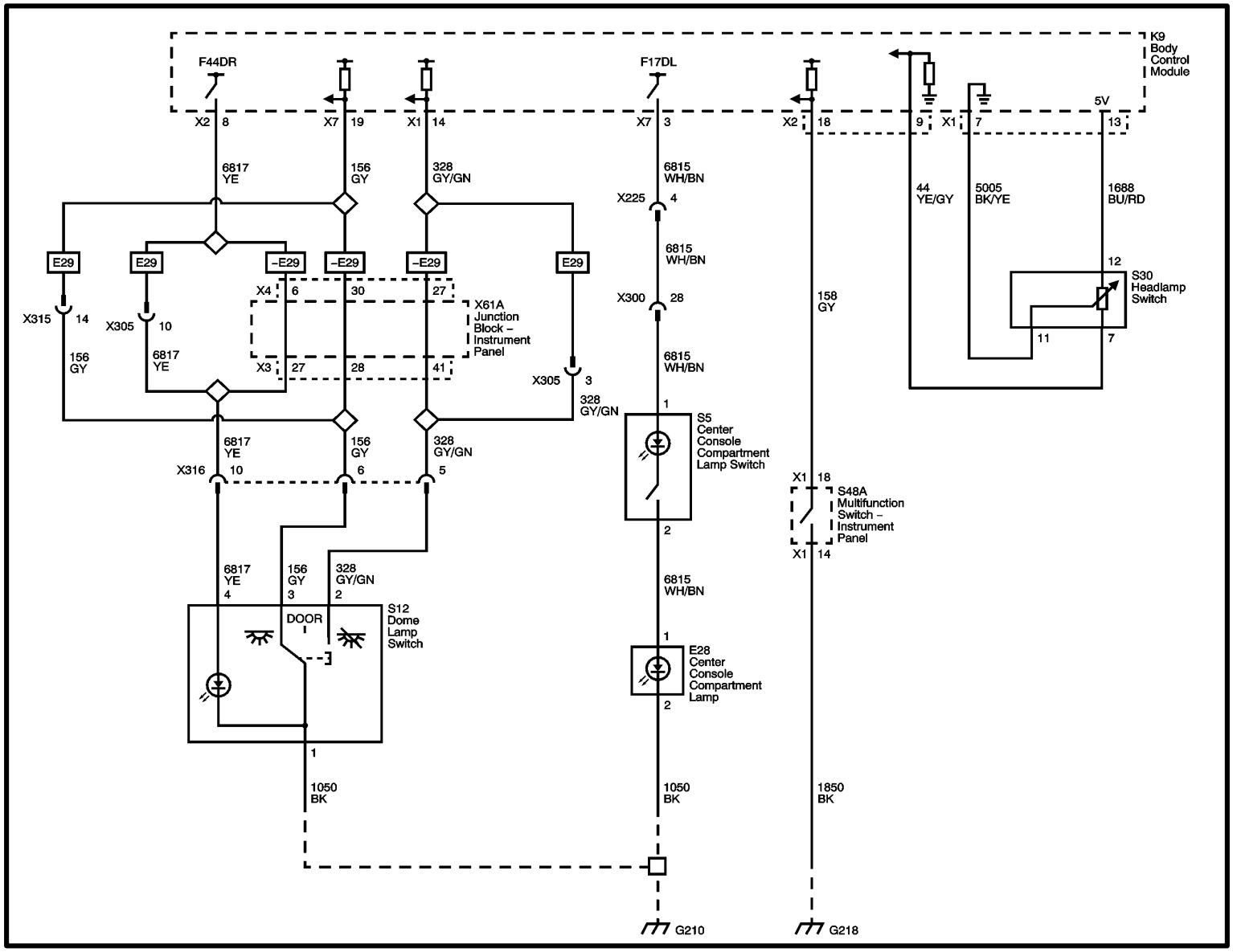
Exterior Lighting –Tail lamps


F9DL
F7DL
F44DR
K9 Body Control Module
X5 1
26
X4 4
18 YE/BU
38 BU/BN
19 BN/GN
B+
X3 A1
X4 L3
X3 A1
X50A Fuse Block – Underhood
KR61 Trailer Backup Lamps Relay
KR125 Trailer Park Lamps Relay
F28UA 15A
F15UA 10A
KR125 Trailer Park Lamps Relay
F27UA 15A
X5 K2
A2
C1
K4
A3
709 VT/GY
18 YE/BU
24 BN/WH
309 GY/BN
19 BN/GN
X1 22
18
9
21
19
X63A Junction Block – Rear Body
X2 5
1
4
X4 1
5
4
709 VT/GY
18 YE/BU
24 GN/WH
309 GY/BN
19 BN/GN
24 GN/WH
E5E Tail Lamp – Left
E5AG Tail/Stop and Turn Signal Lamp – Left Upper
E5A Backup Lamp – Left
E5U Tail/Stop and Turn Signal Lamp – Left Lower
(Z88) E2LR Side Marker Lamp – Left Rear
E5F Tail Lamp Right
E5AH Tail/Stop and Turn Signal Lamp – Right Upper
E5B Backup Lamp – Right
E5V Tail/Stop and Turn Signal Lamp – Right Lower
(Z88) E2RR Side Marker Lamp – Right Rear
1750 BK
2150 BK
G400
G121

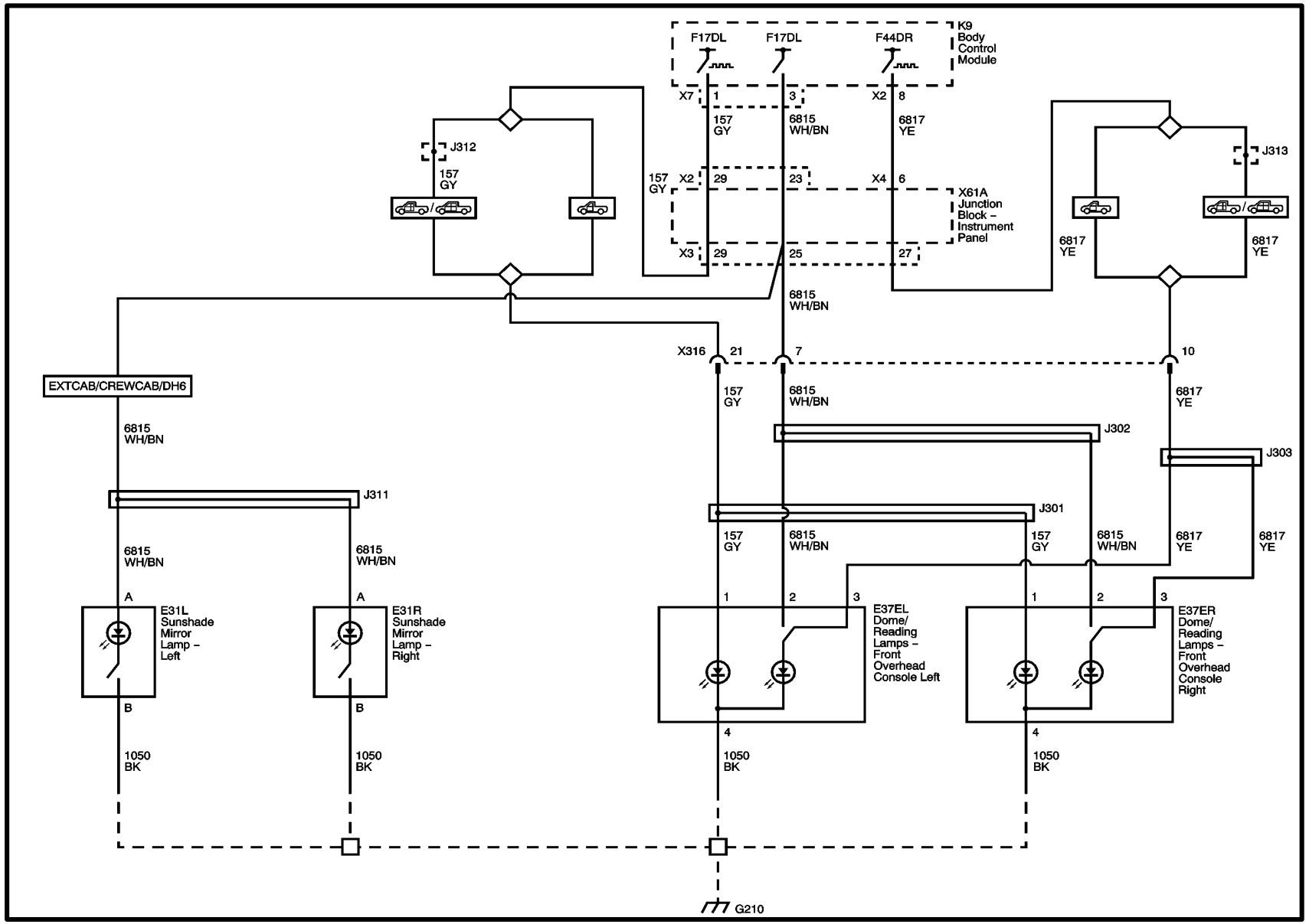
Exterior Lighting – CHMSL and License Plate lamps



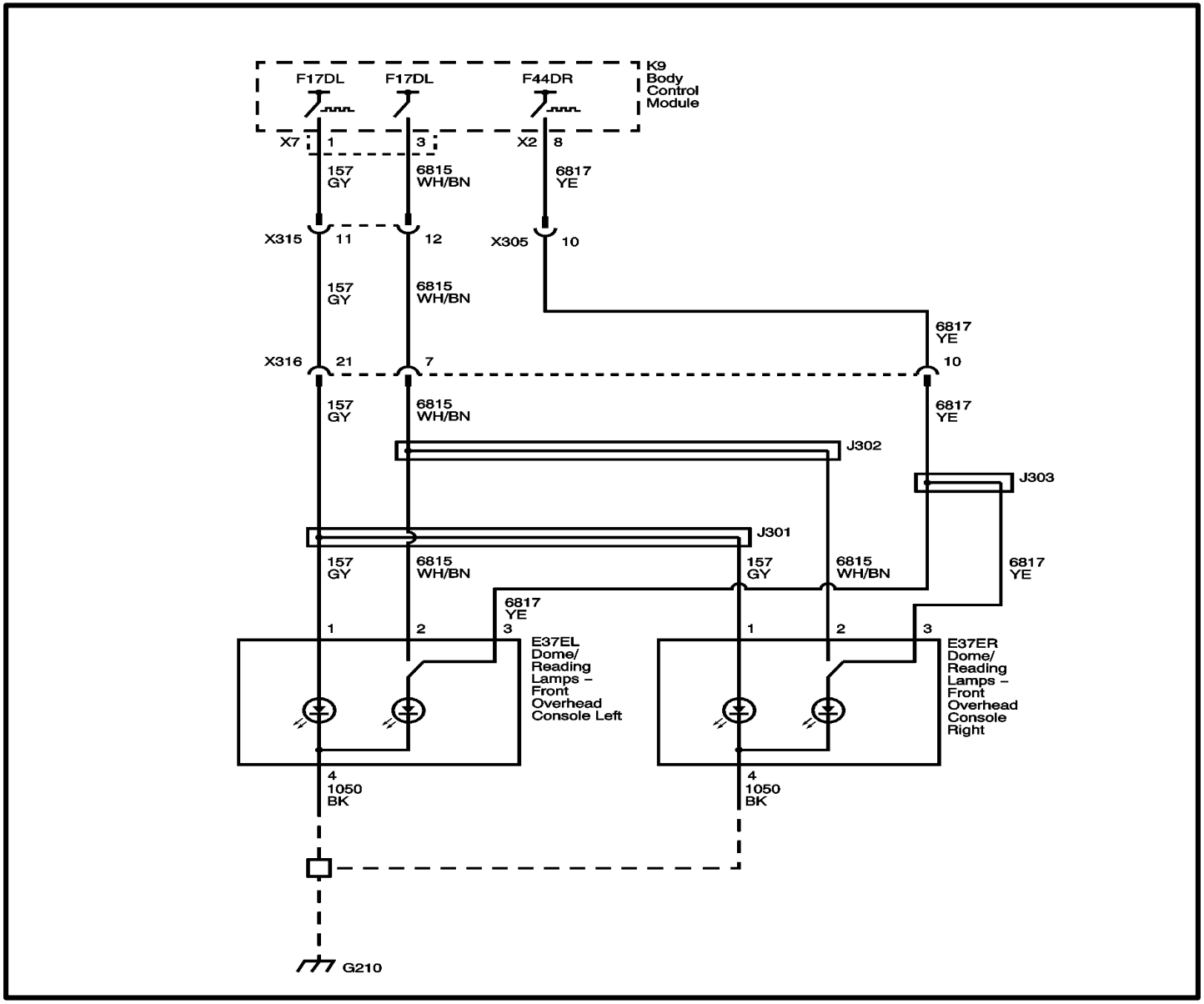
Interior Lighting – Controls (DD7)



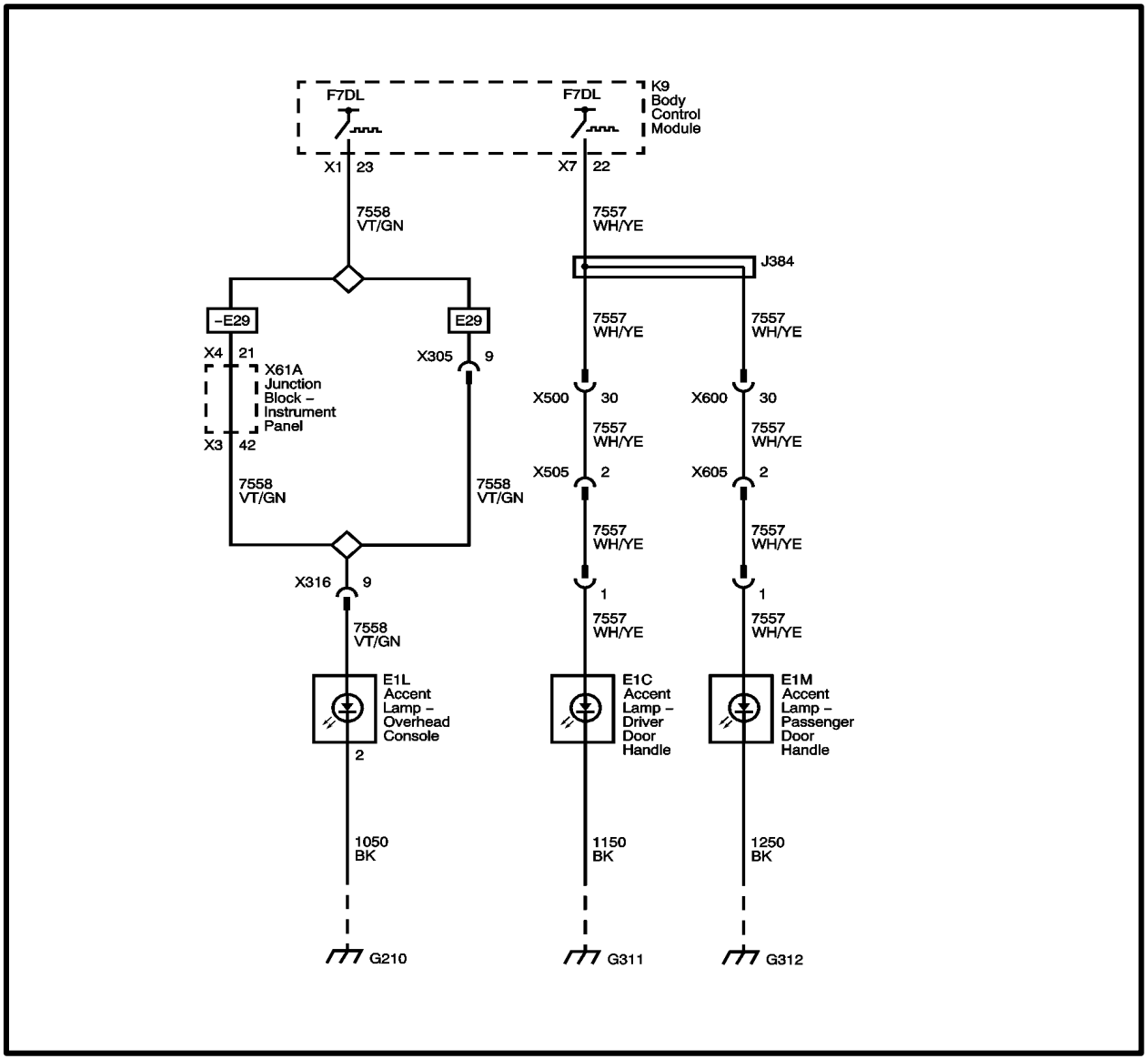
Interior Lighting – Front Dome Lamps (-E29), DH6



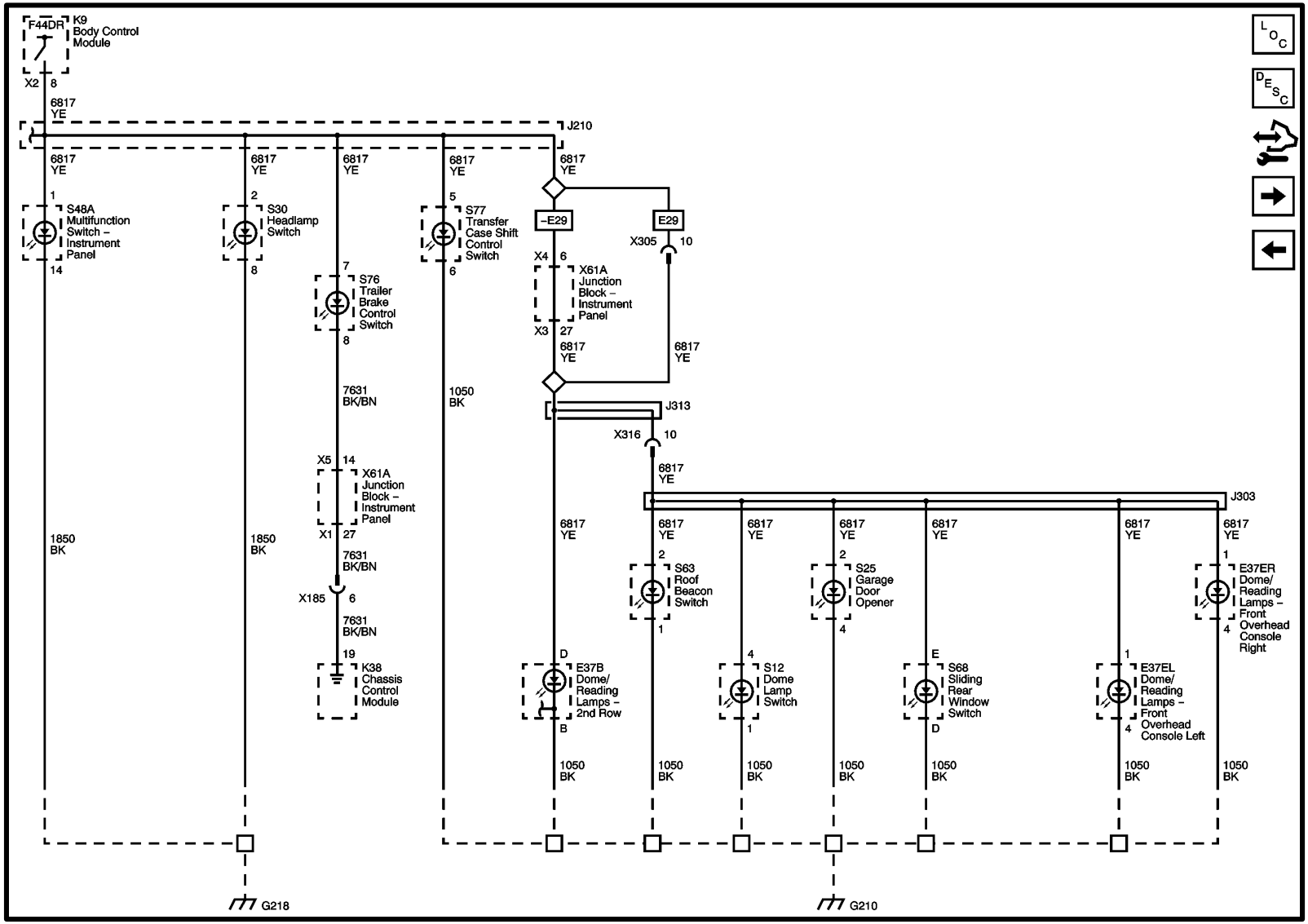
Interior Lighting – Front Dome Lamps (E29)



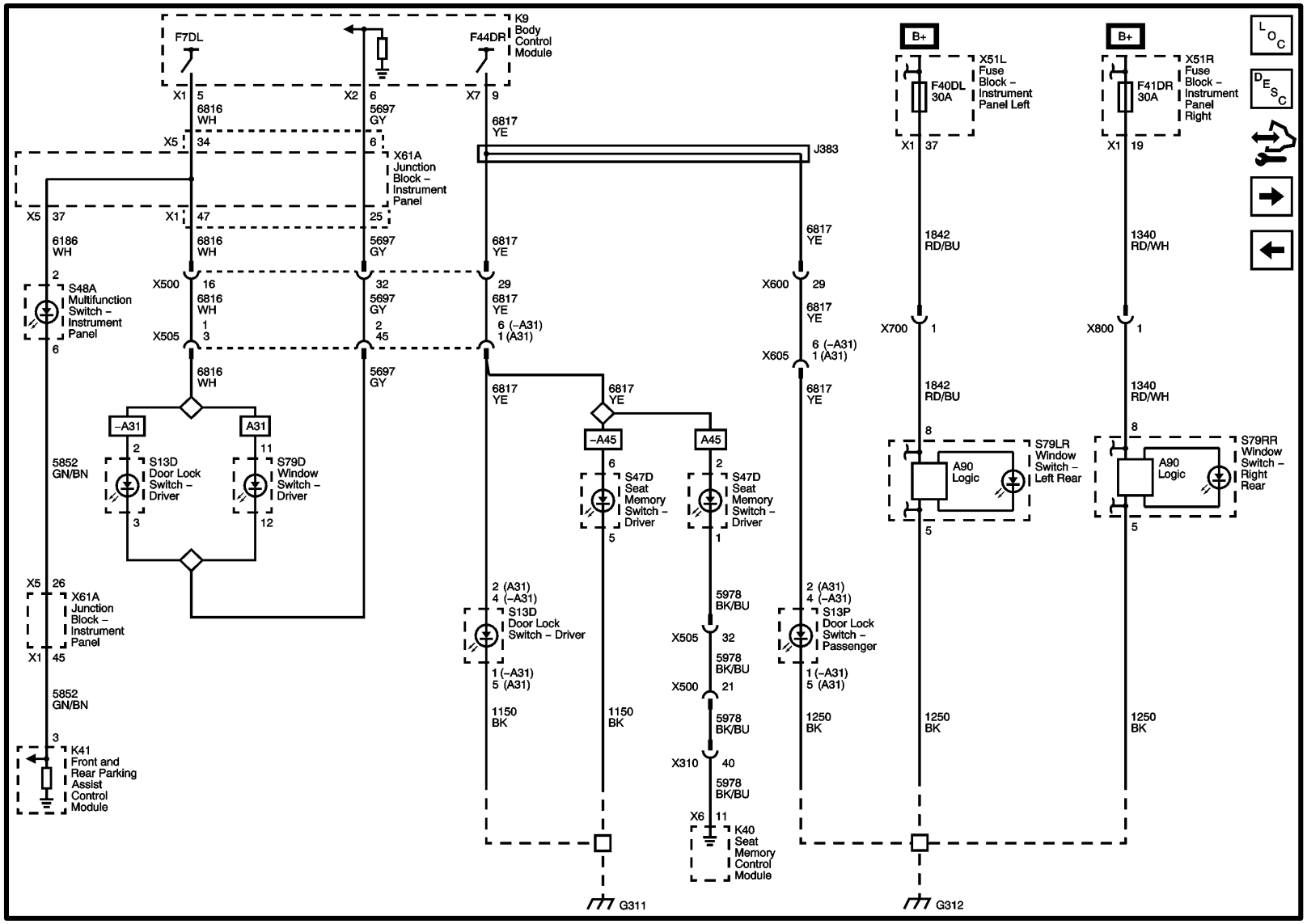
Interior Lighting – Accent Lamps



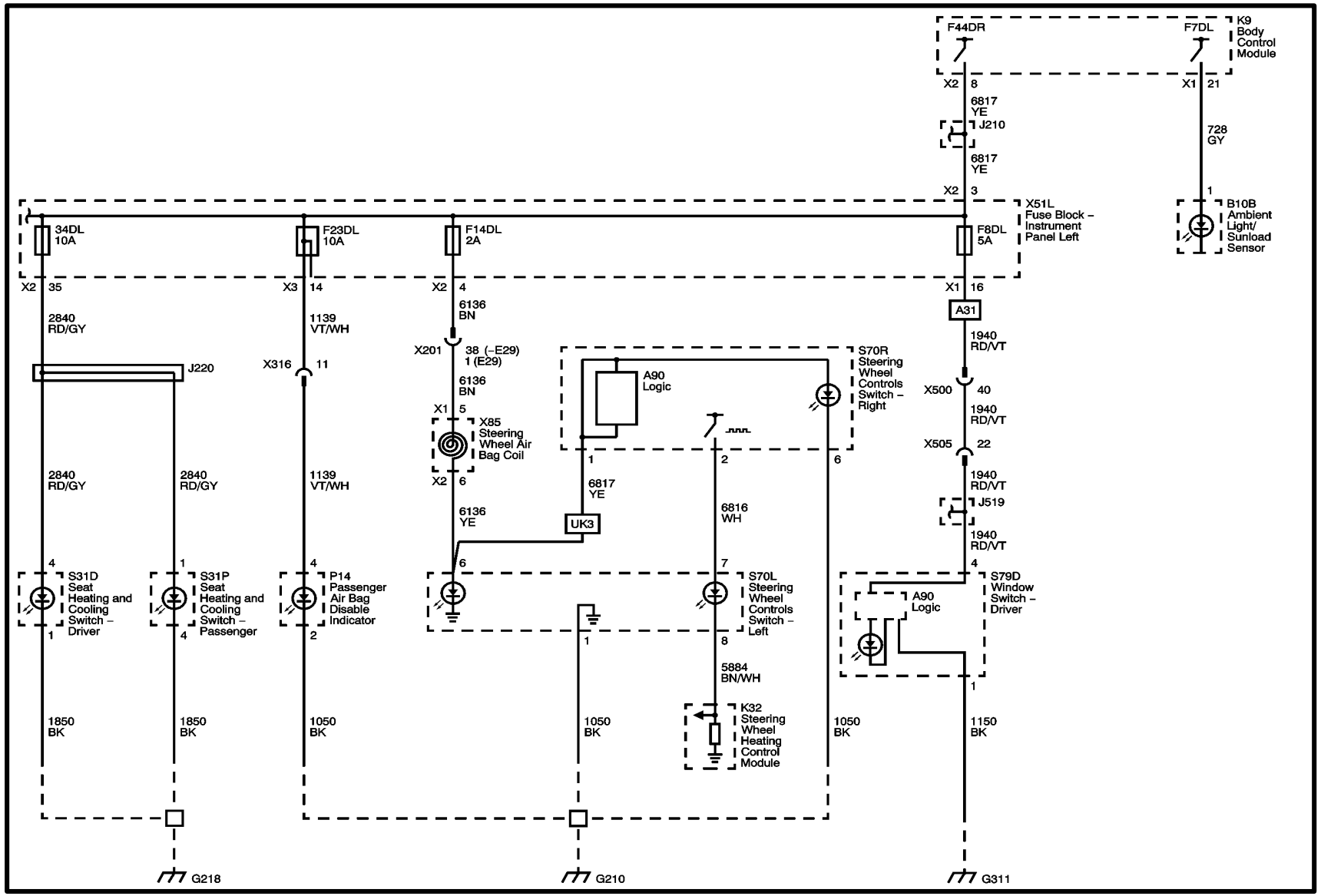
Interior Lighting – Dimming (1 of 3)



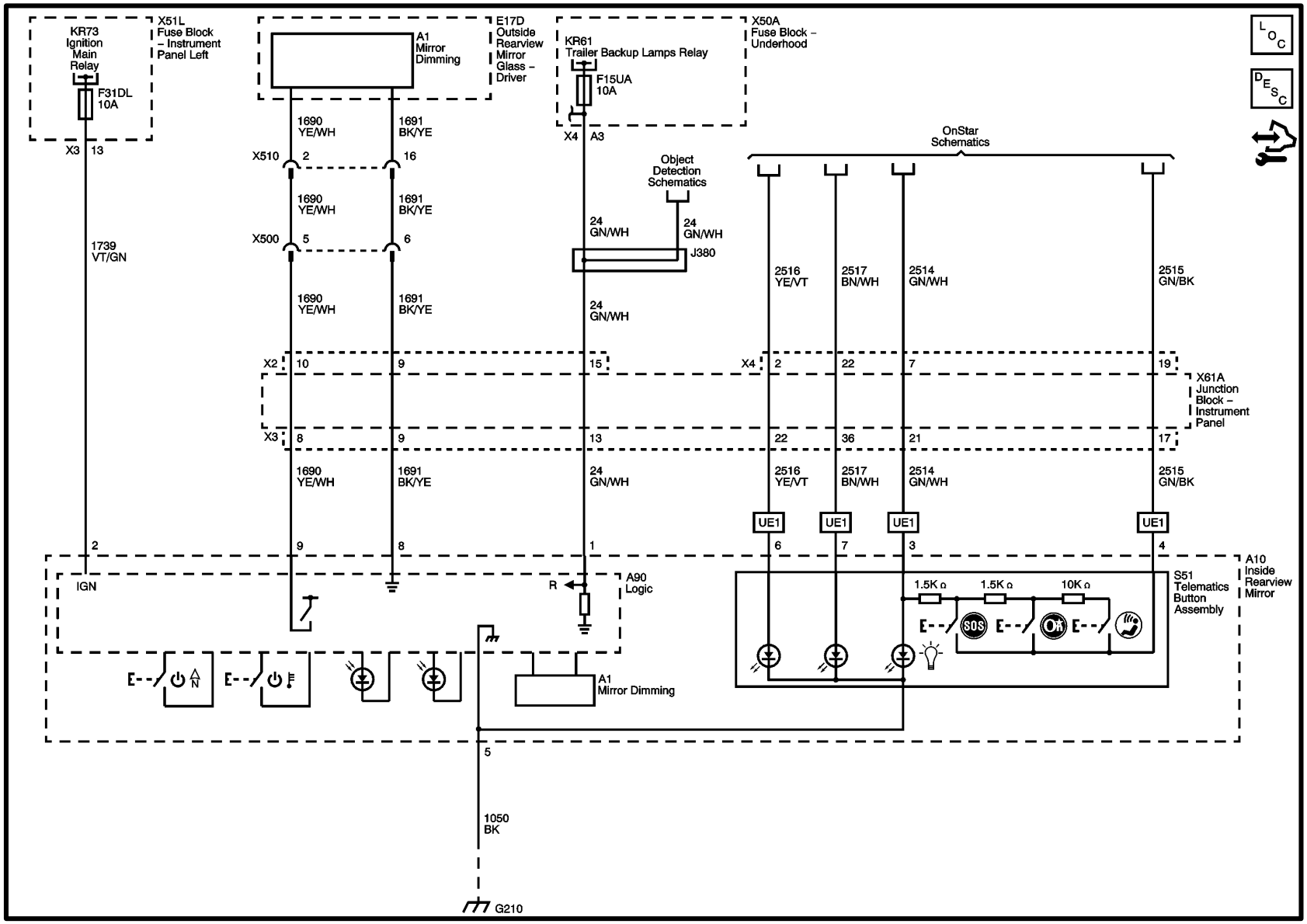
Interior Lighting – Dimming (2 of 3)



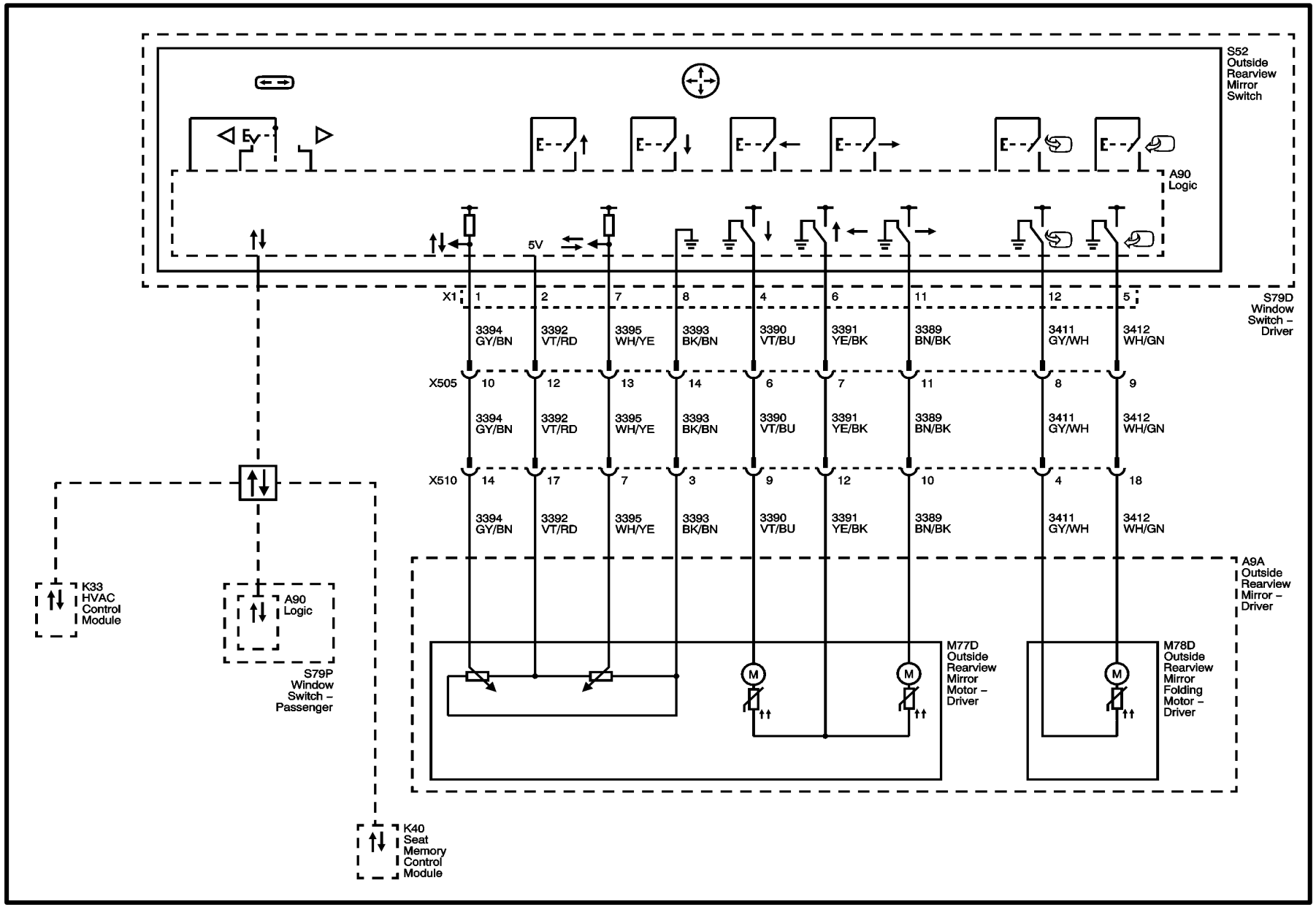
Interior Lighting – Dimming (3 of 3)



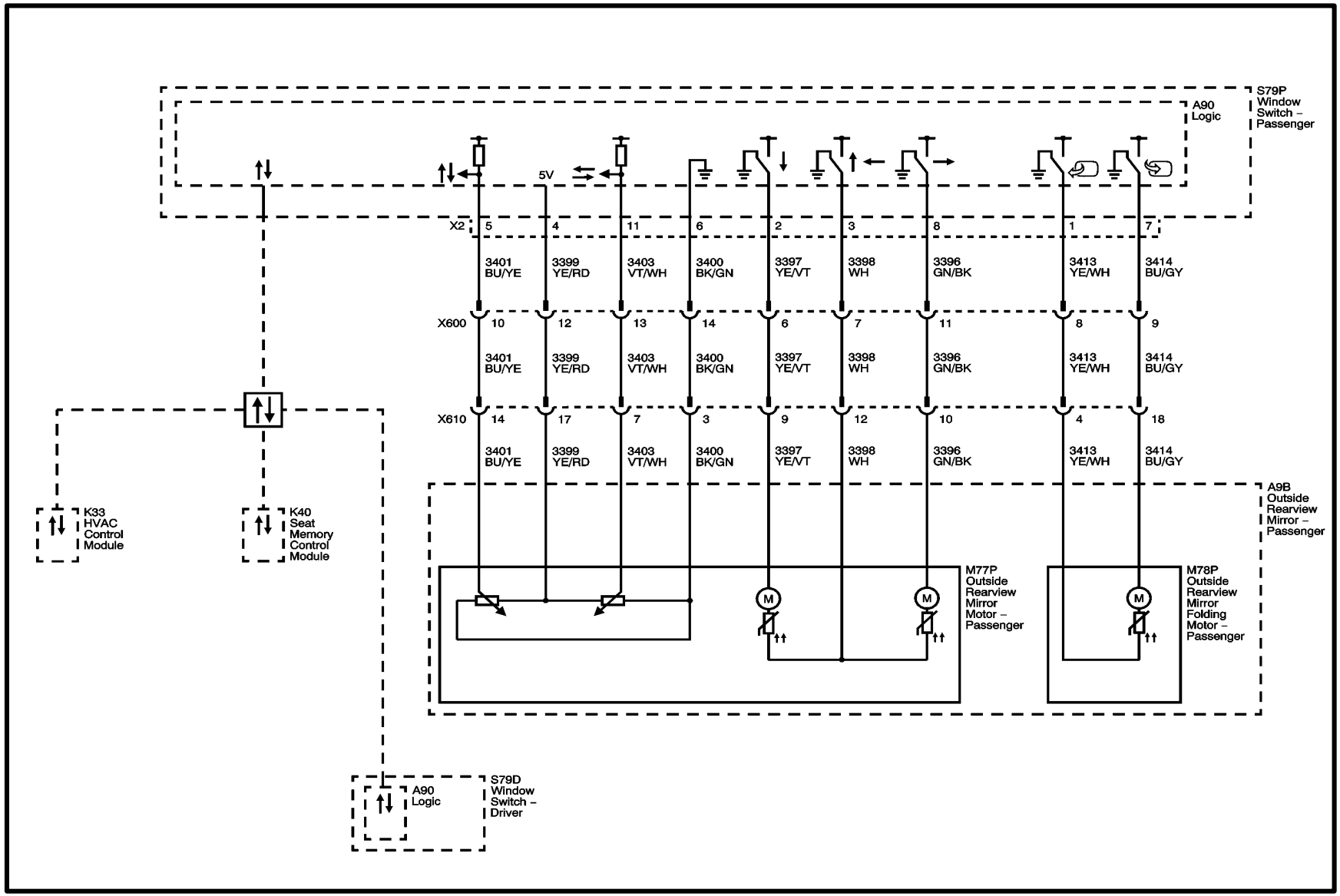
Mirrors – Inside Rearview (DD8)



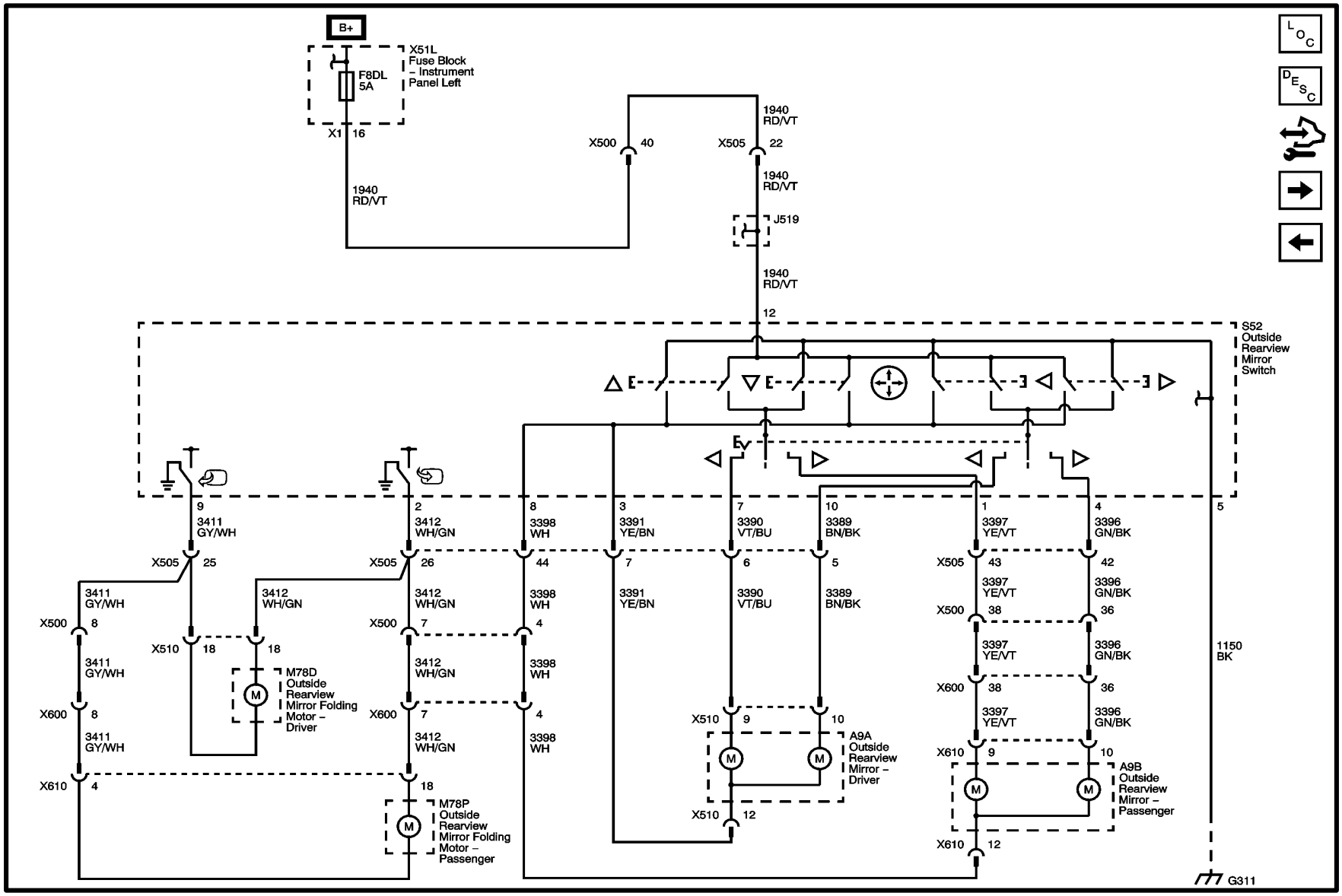
Mirrors – Outside Rearview Driver (with A45)



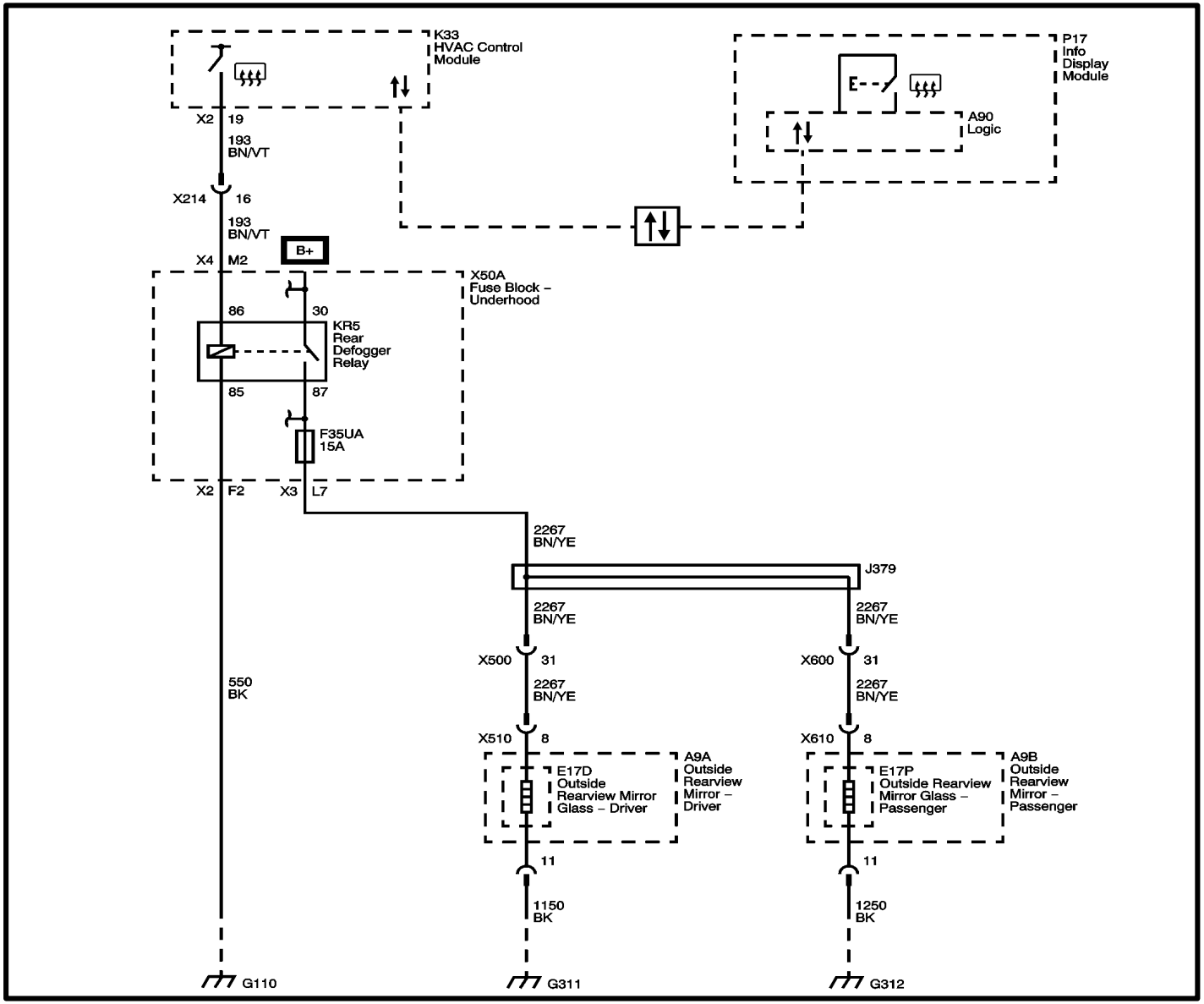
Mirrors – Outside Rearview Passenger (with A45)



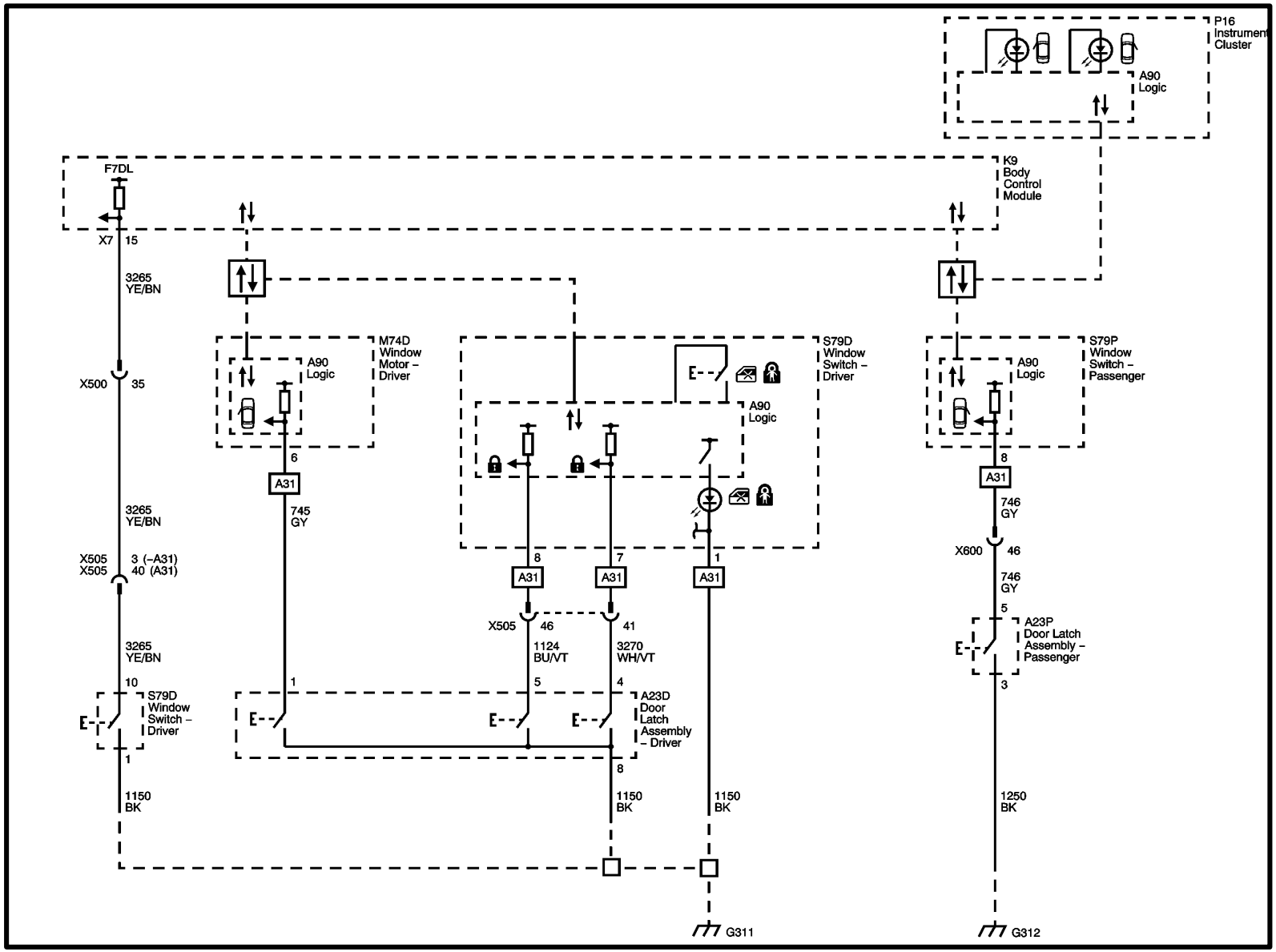
Mirrors – Outside Rearview Position Controls (without A45)



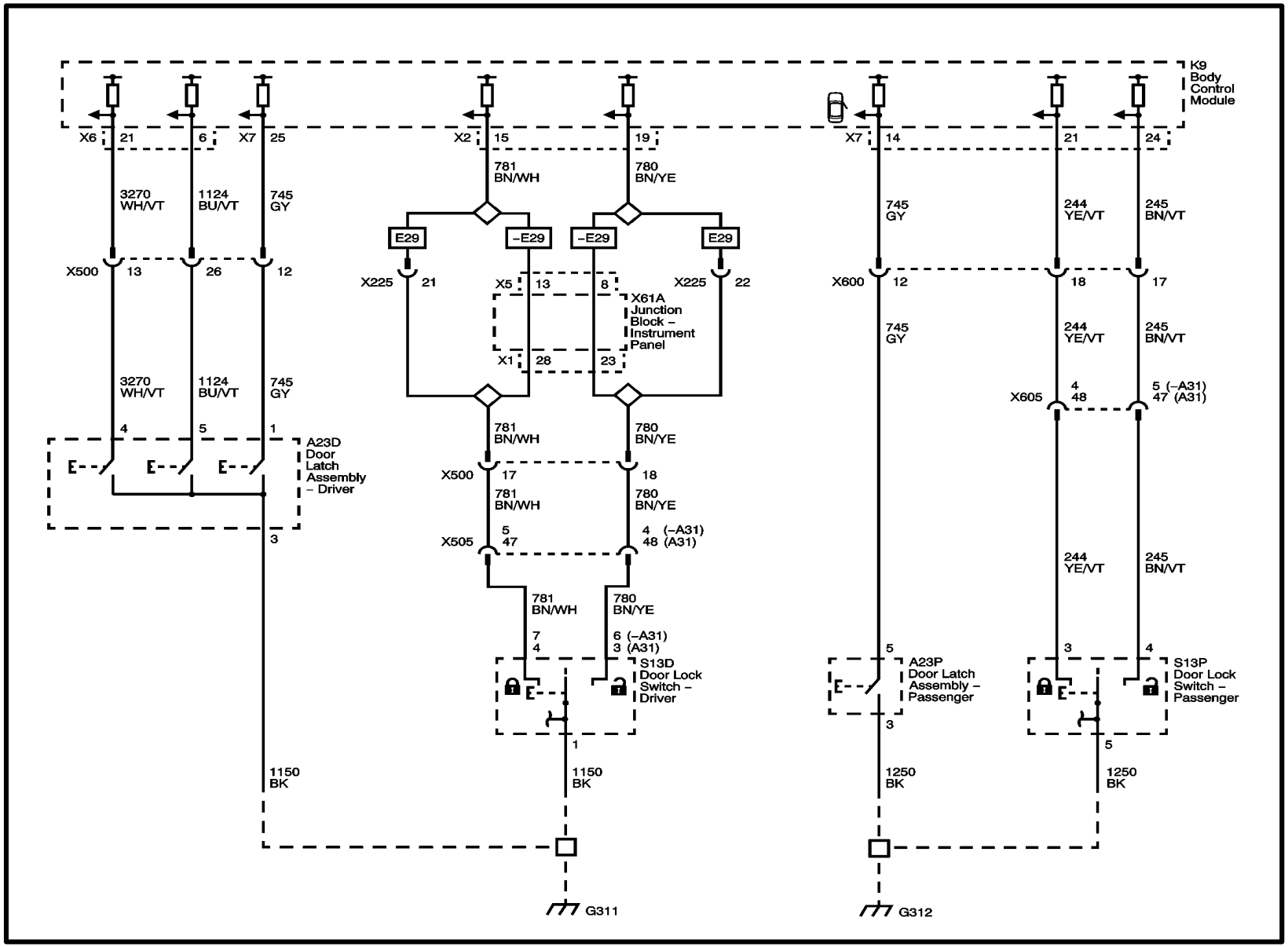
Mirrors – Outside Rearview Heat (DL8, DL3 or DPN)



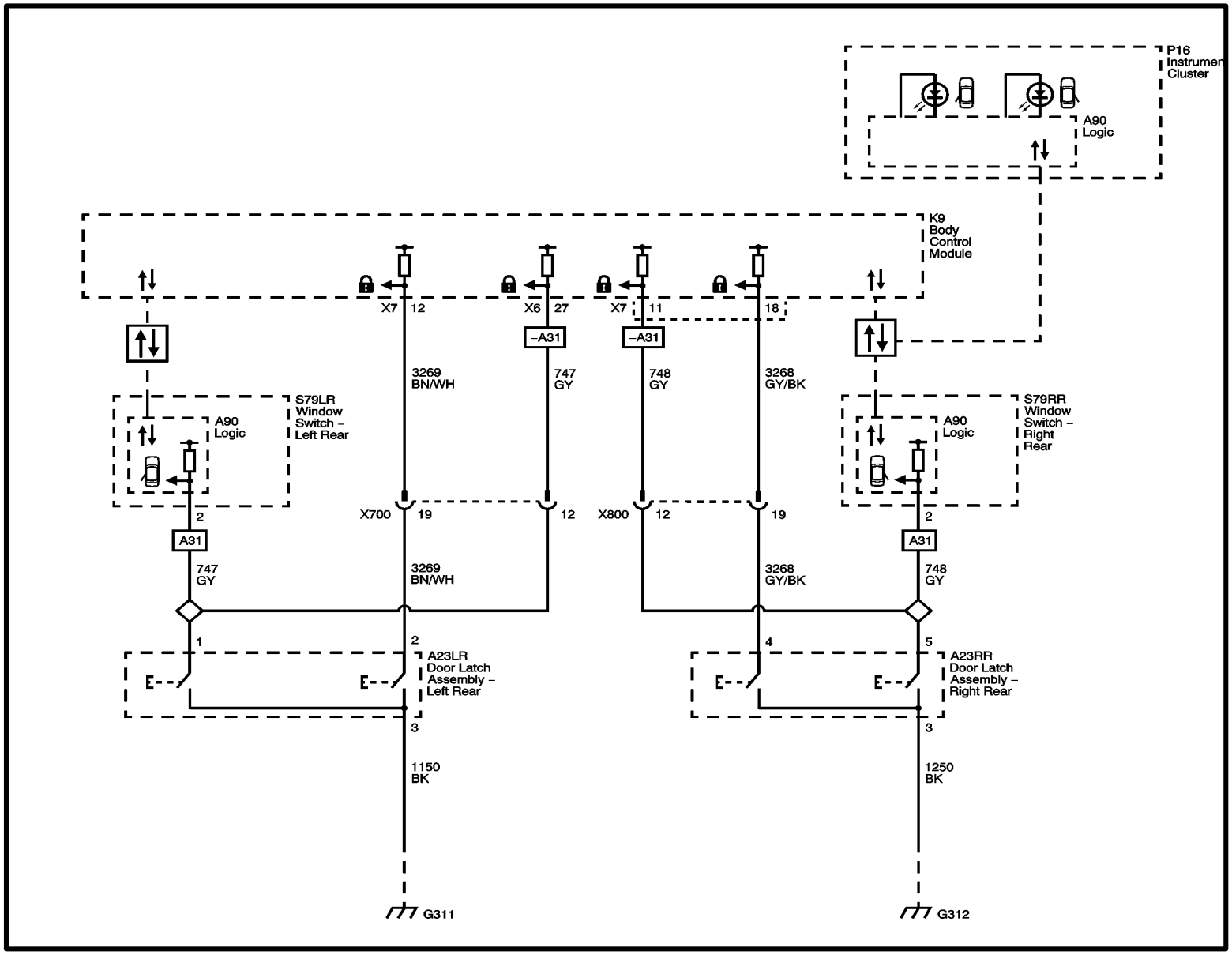
Vehicle Access - Front Switches and Indicators (1 of 2)



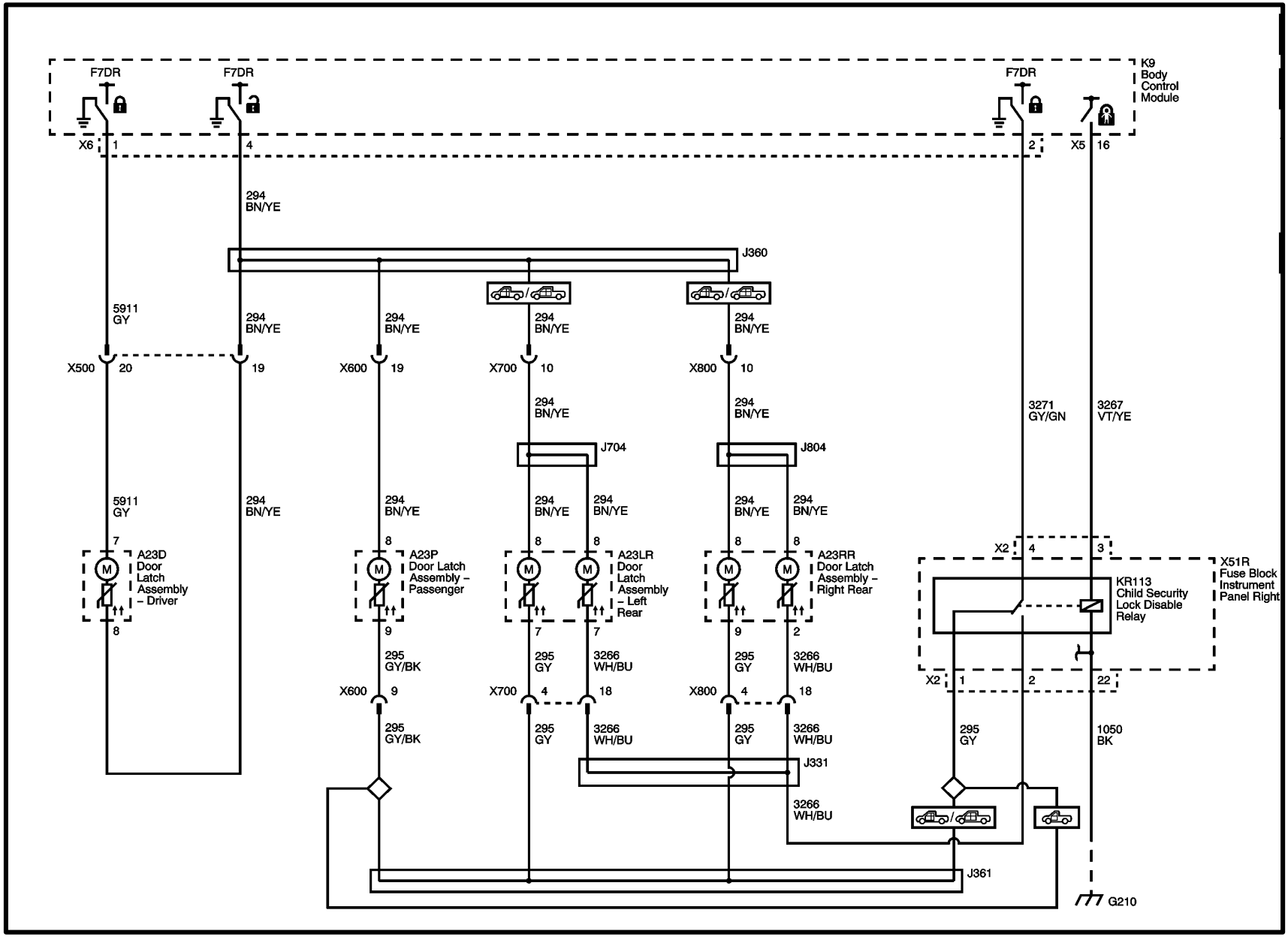
Vehicle Access - Front Switches and Indicators (2 of 2)



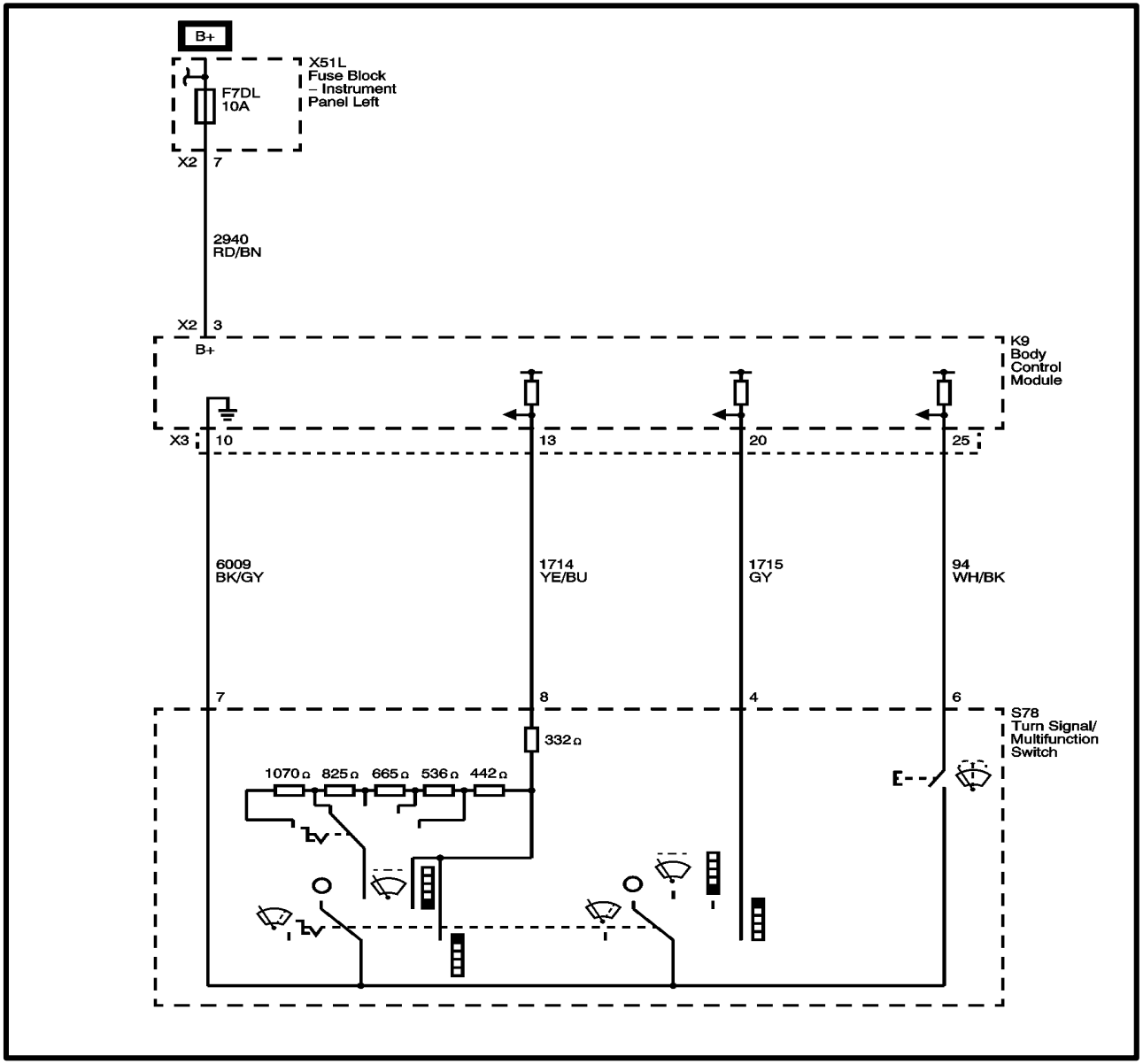
Vehicle Access - Rear Switches and Indicators



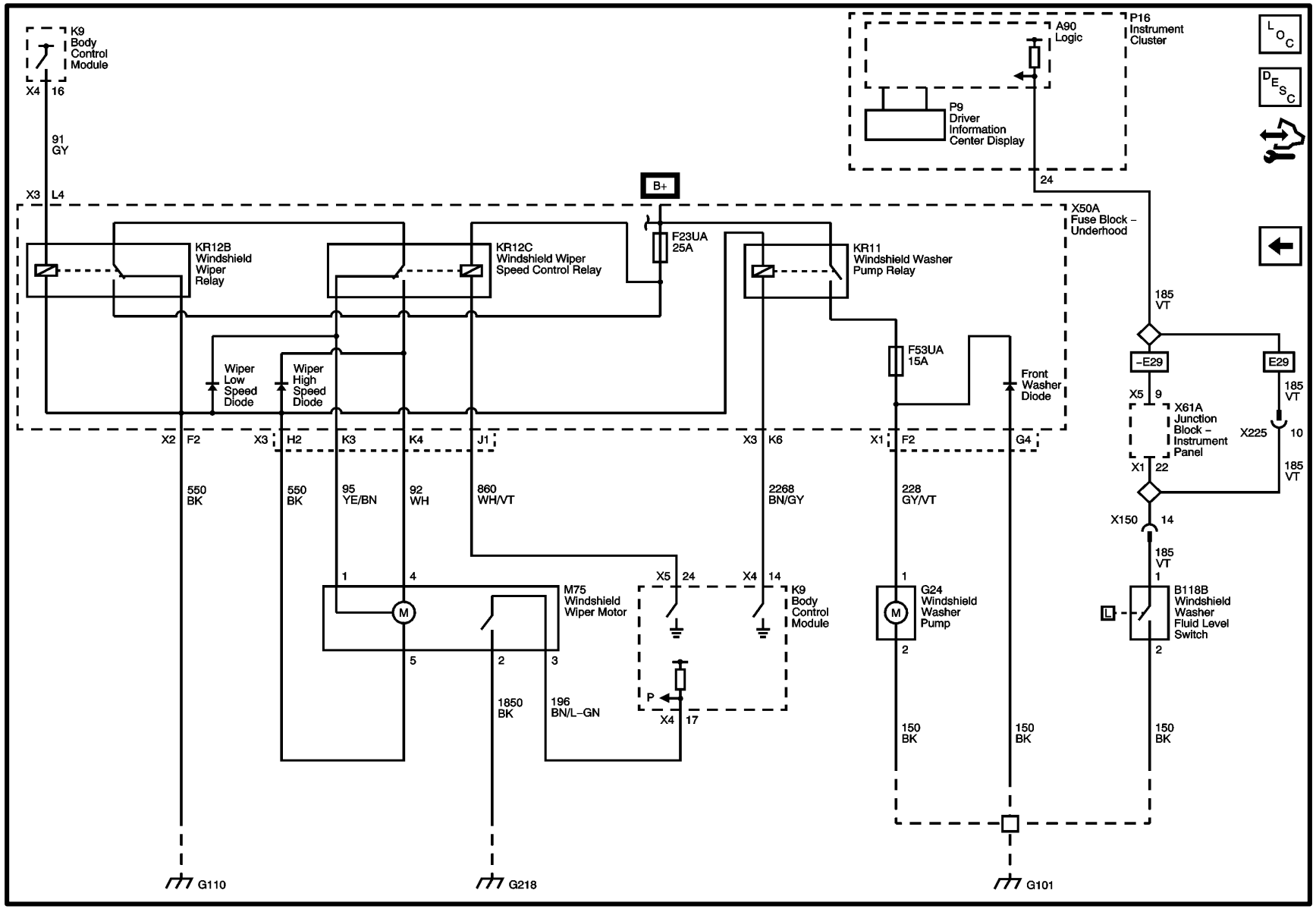
Vehicle Access – Actuators



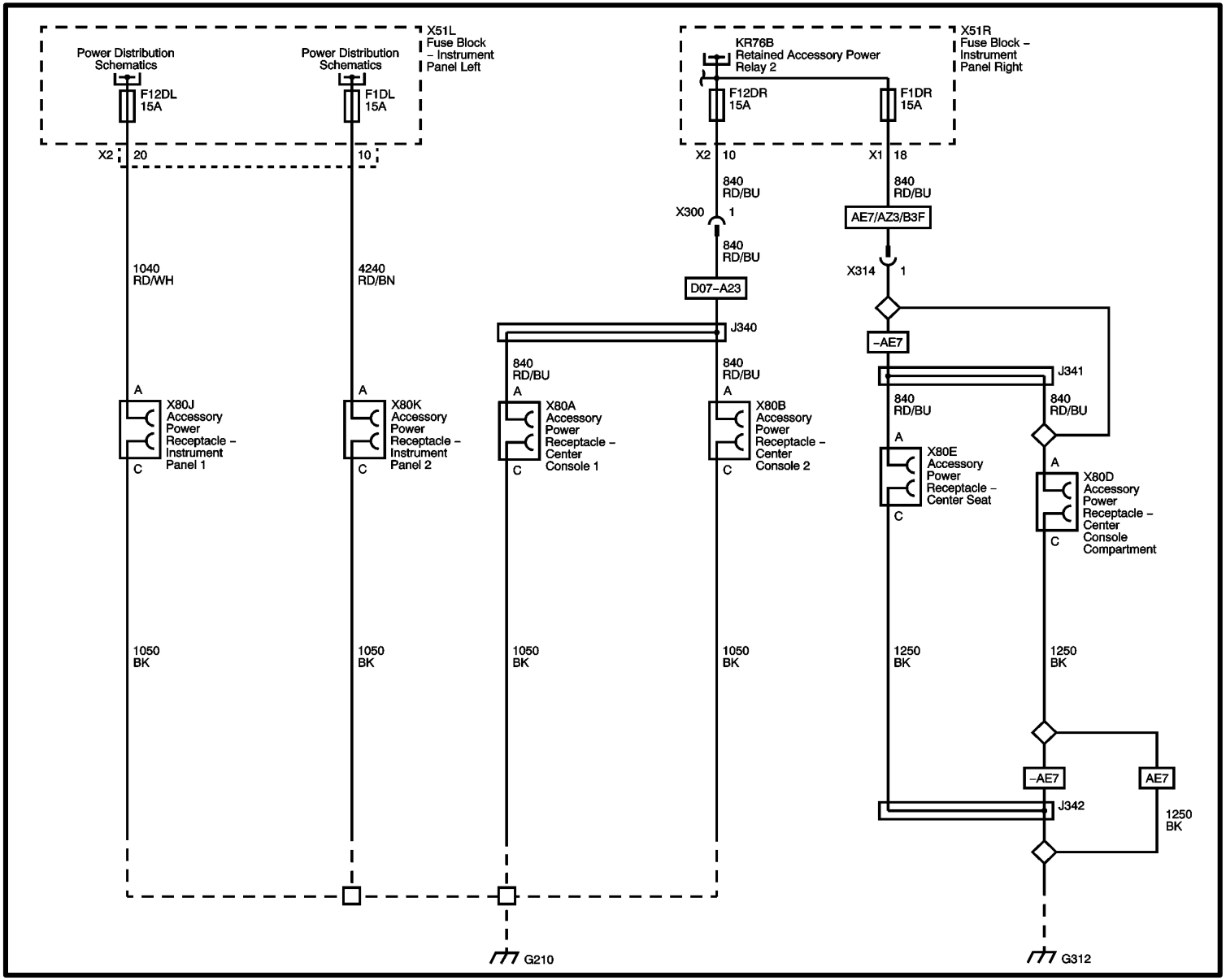
Wipers and Washers – Controls



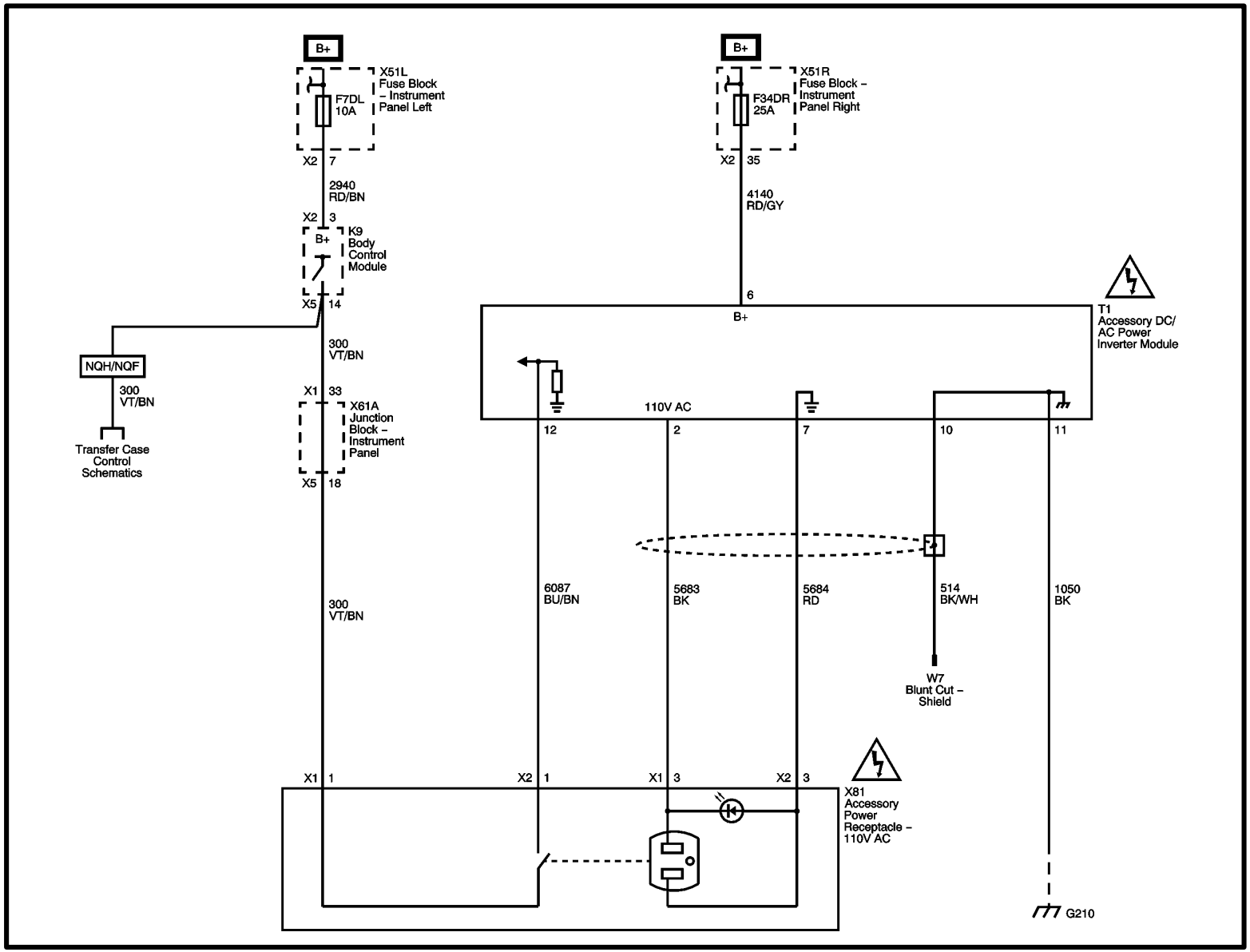
Wipers and Washers – Motor and Washers



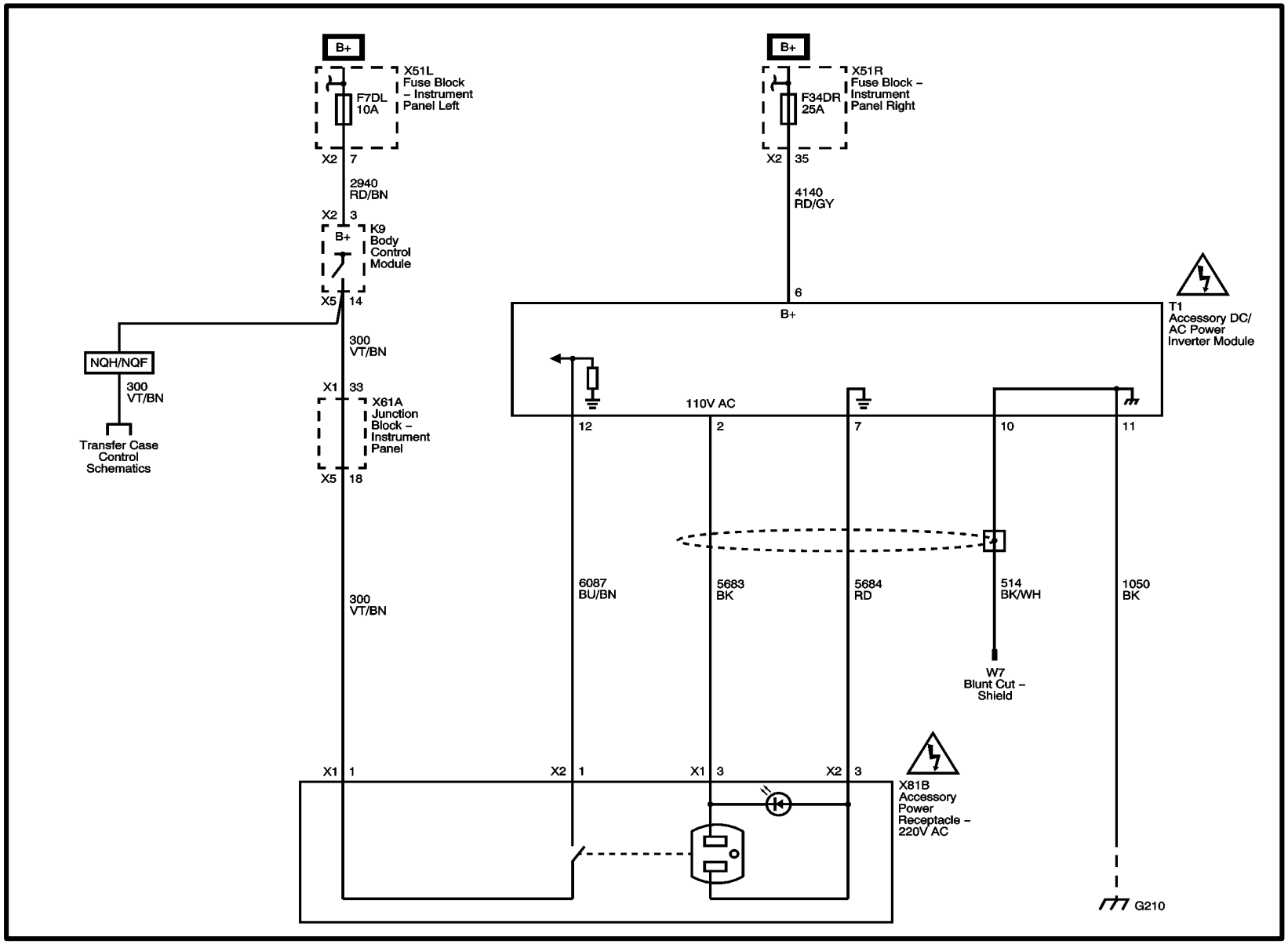
Cigar Lighter/Power Outlets – 12V DC



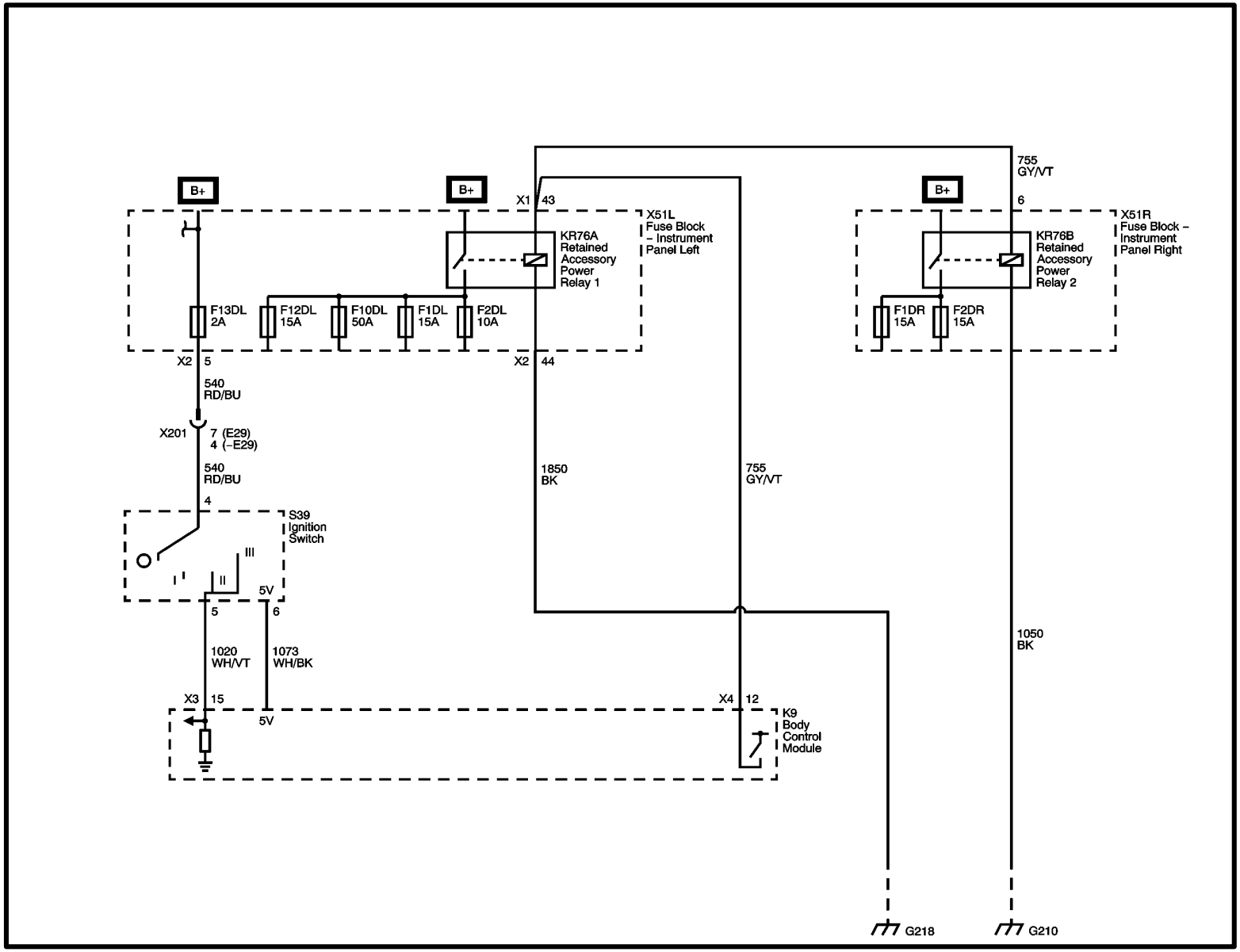
Cigar Lighter/Power Outlets – 110V AC



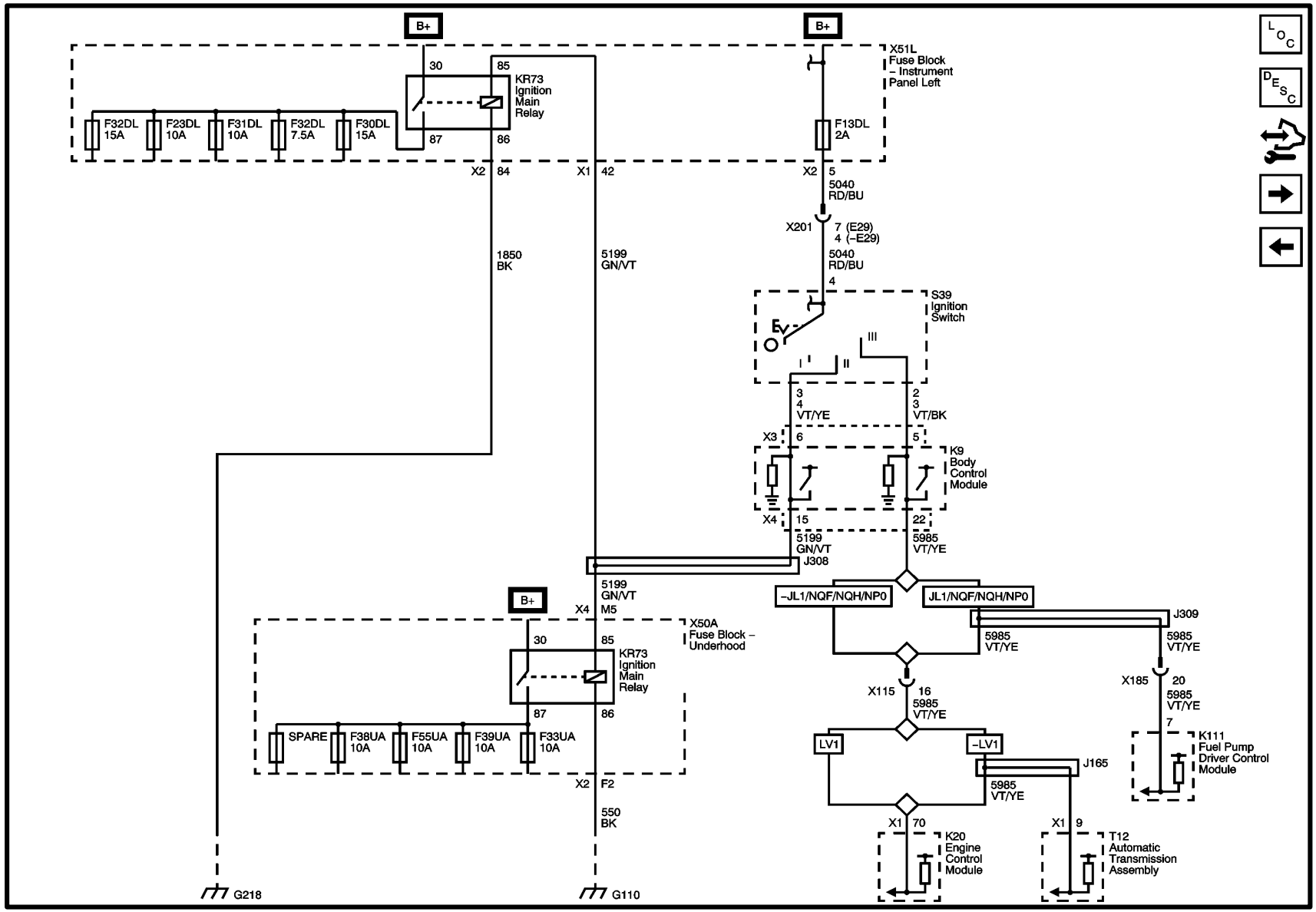
Cigar Lighter/Power Outlets – 220V AC



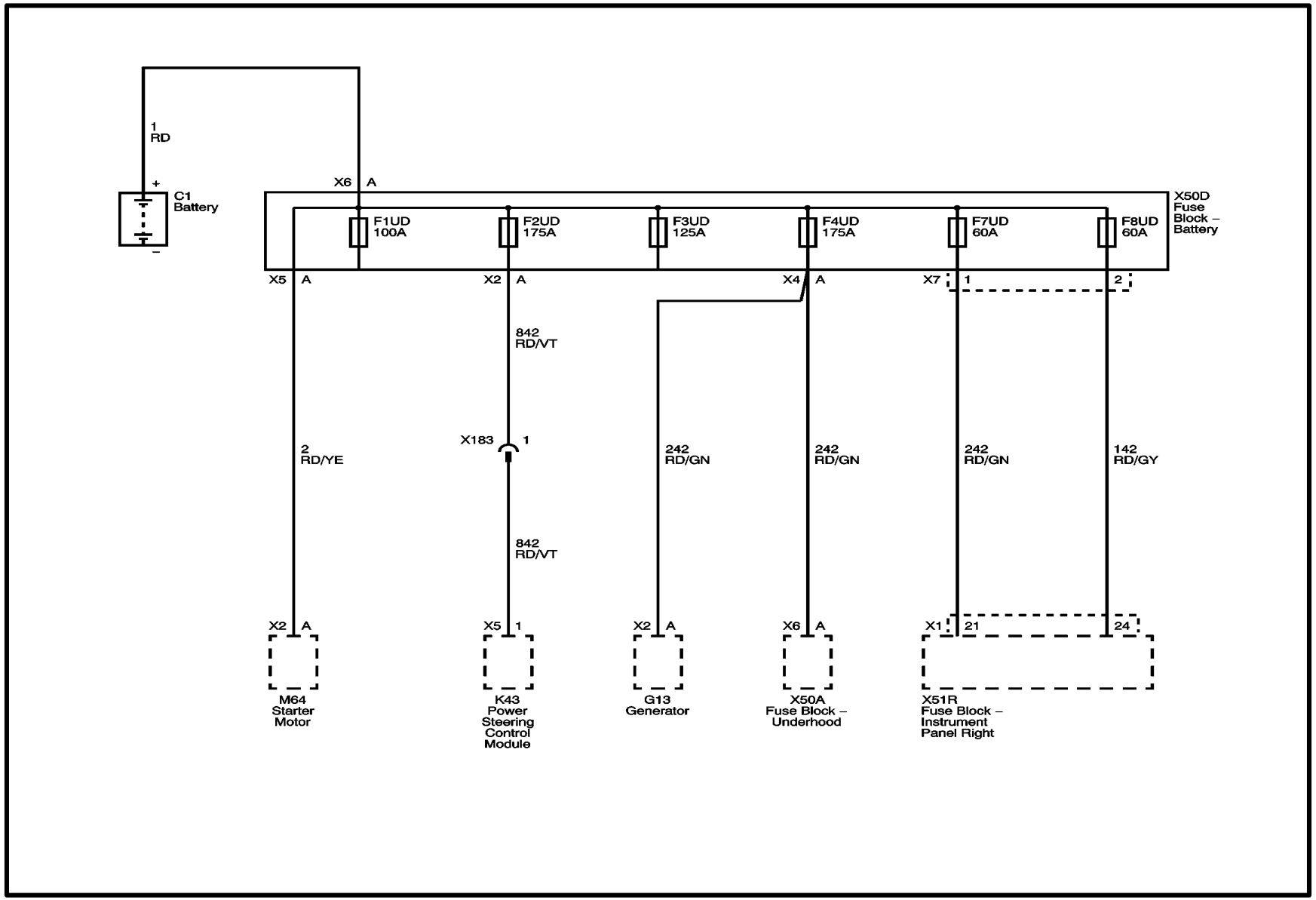
Power Moding Schematics - Ignition Off, Ignition I and Retained Accessory



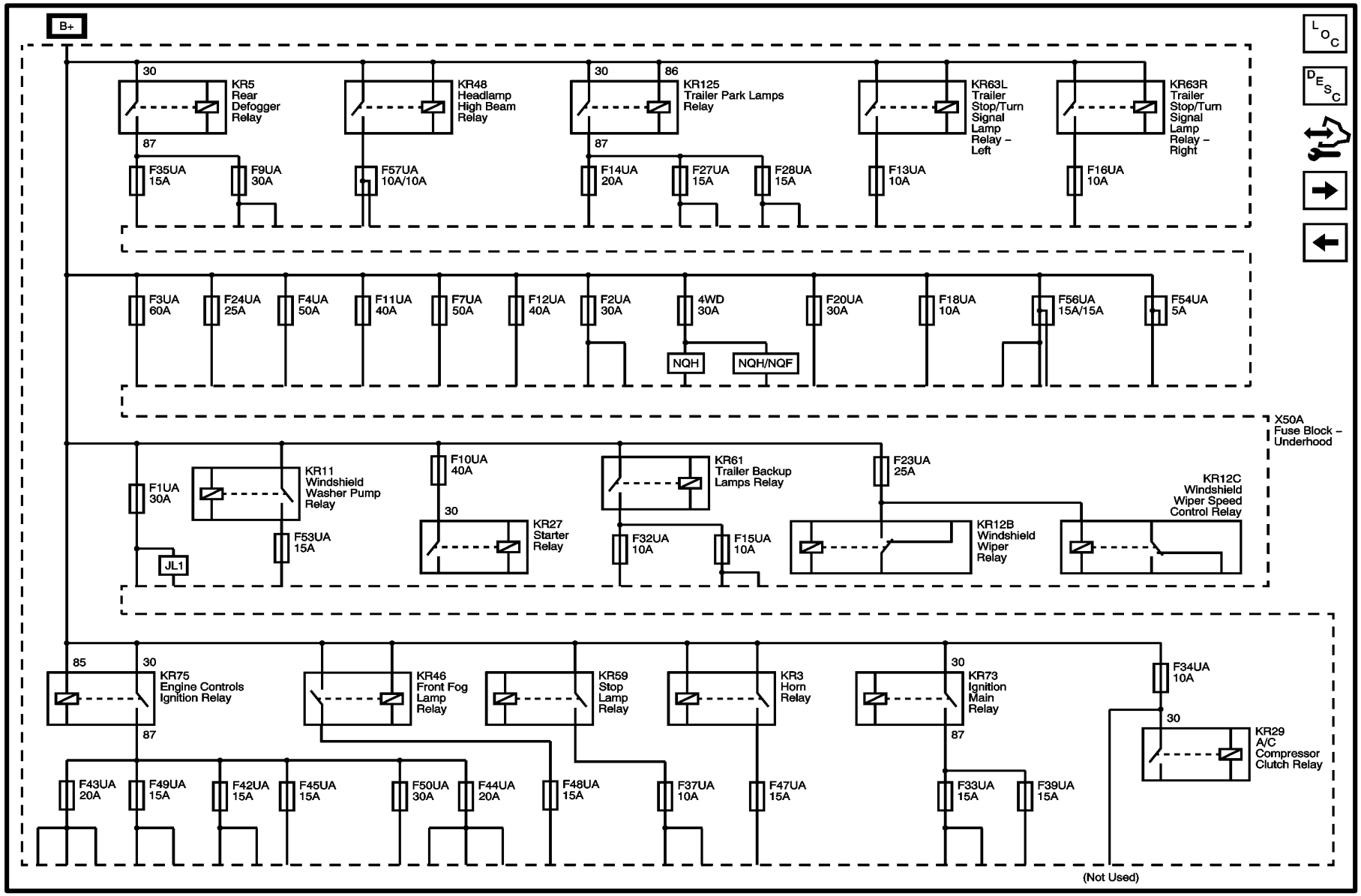
Power Moding Schematics - Ignition II and Ignition III



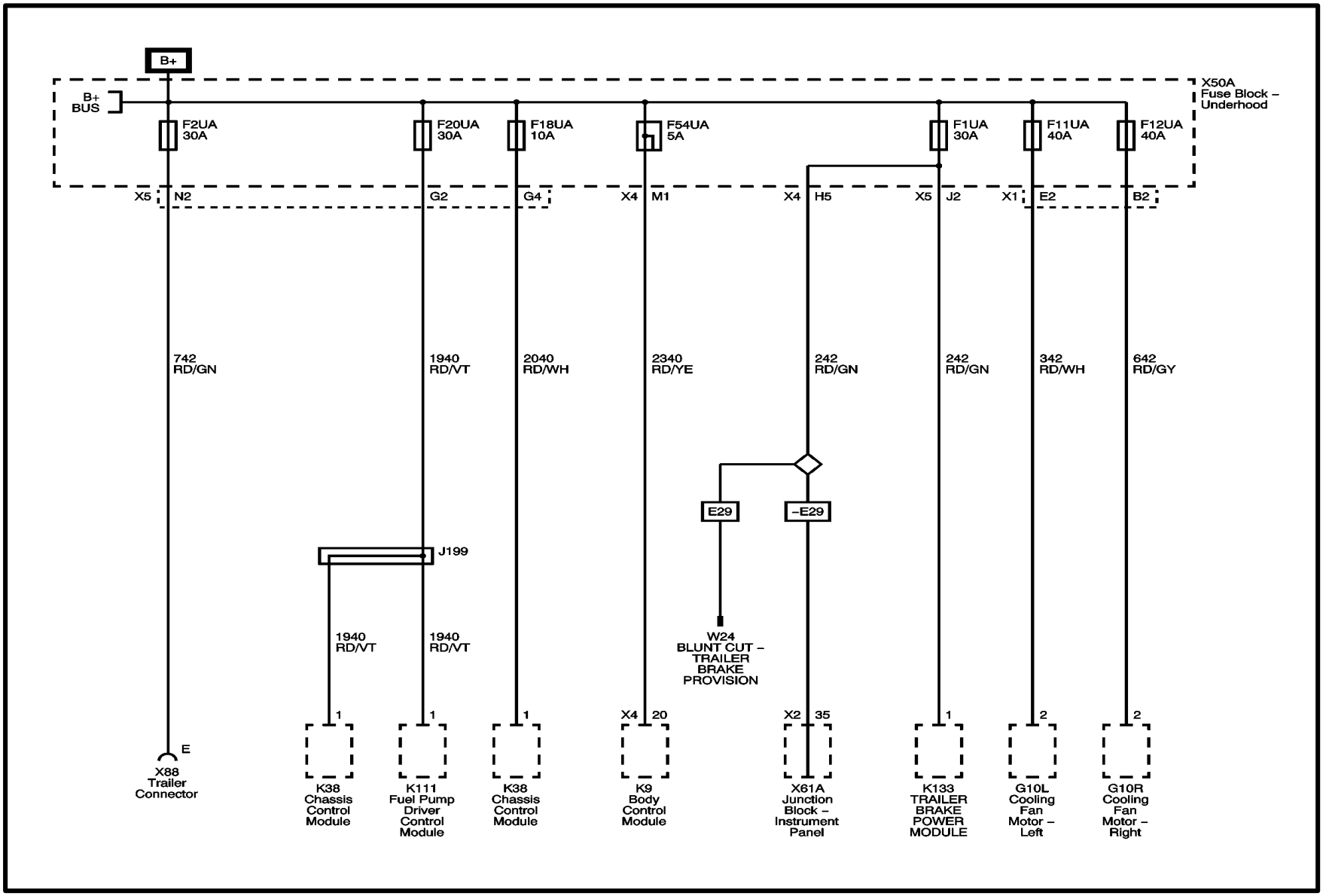
Power Distribution Schematics - X50D Fuse Block - Battery



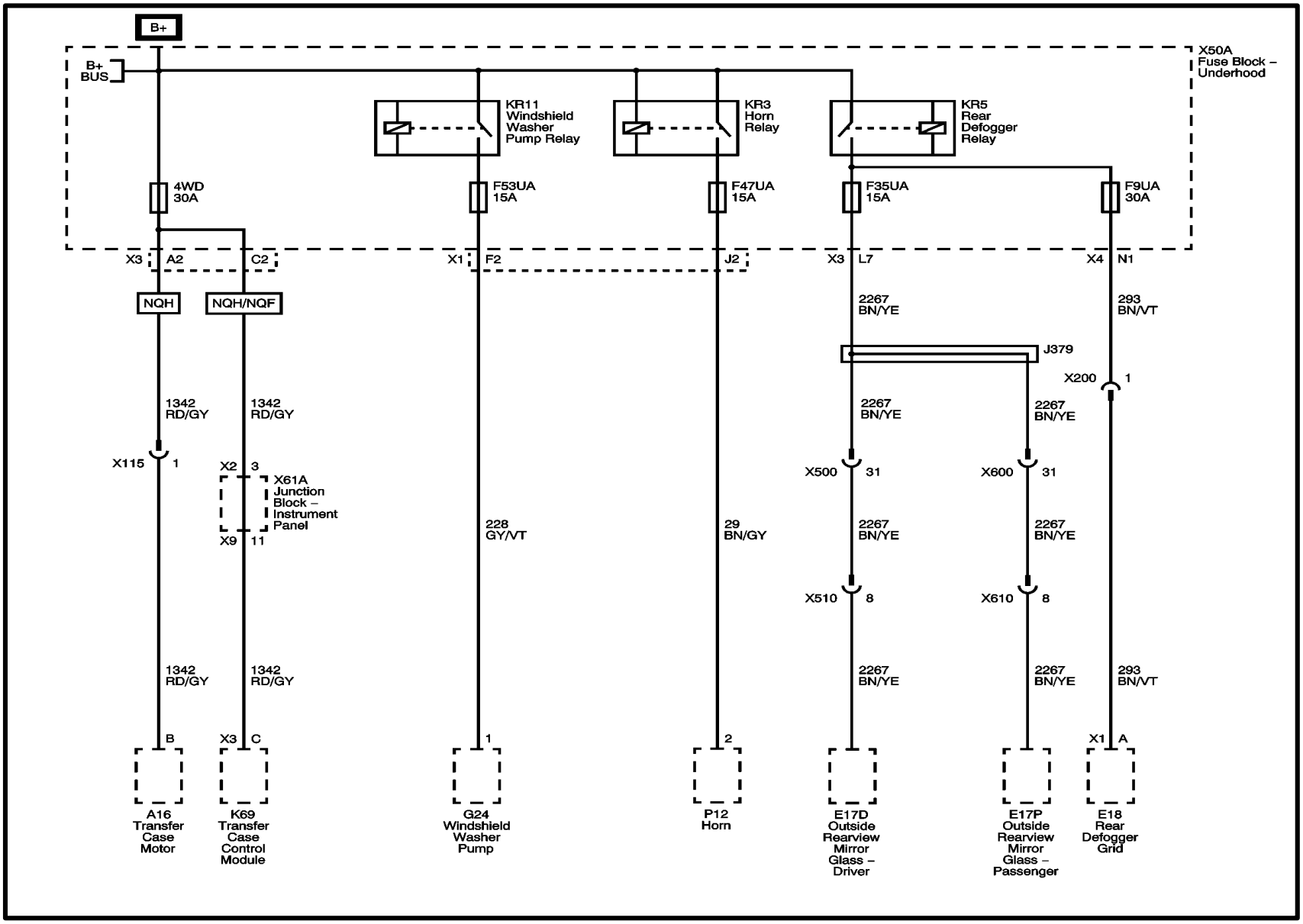
Power Distribution Schematics X50A Fuse Block – Under-hood Bussing



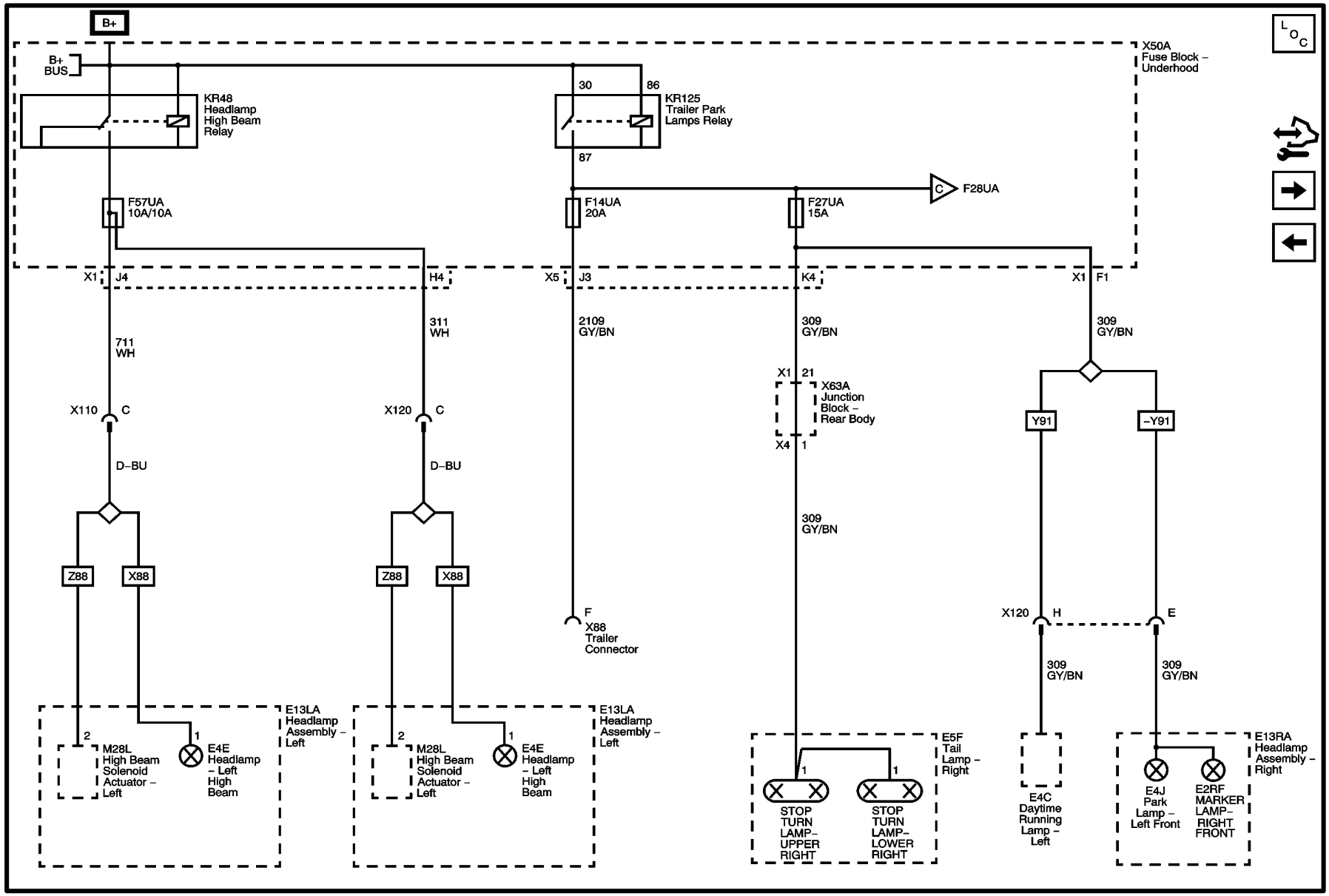
Power Distribution Schematics - F1UA, F2UA, F11UA, F12UA, F18UA, F20UA and F54UA



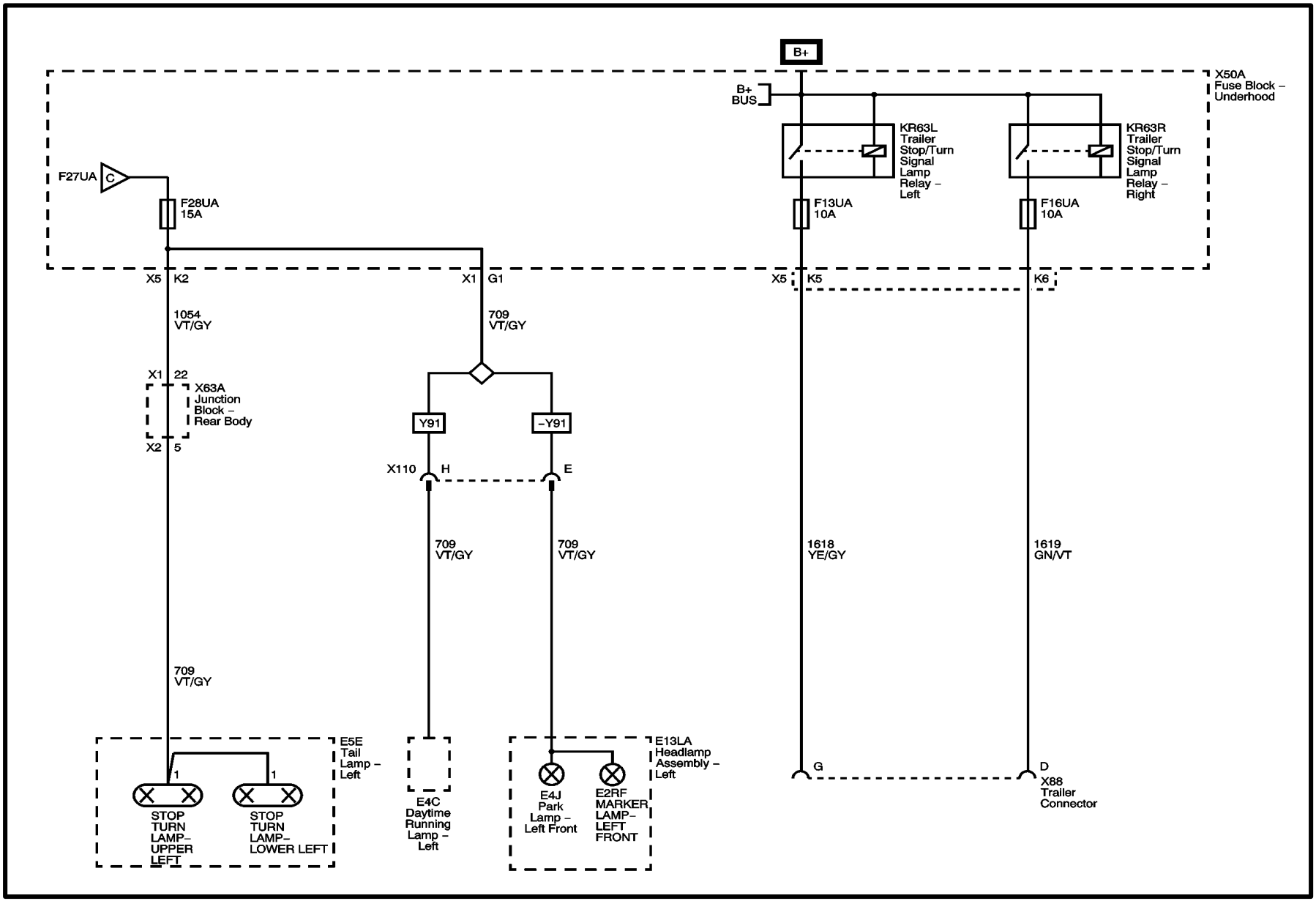
Power Distribution Schematics - 4WD Fuse, F9UA, F35UA, F47UA and F53UA



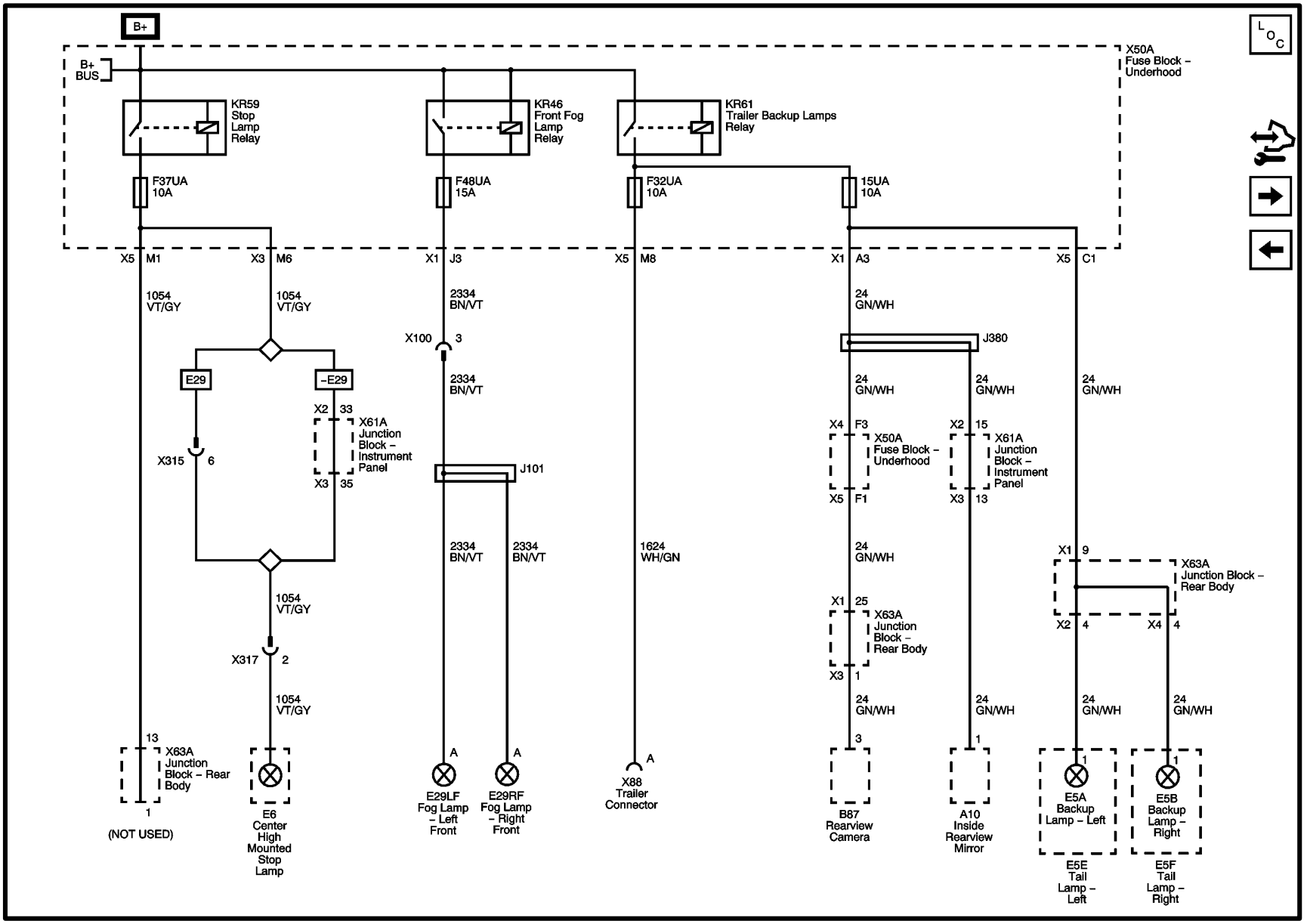
Power Distribution Schematics - F14UA, F27UA and F57UA



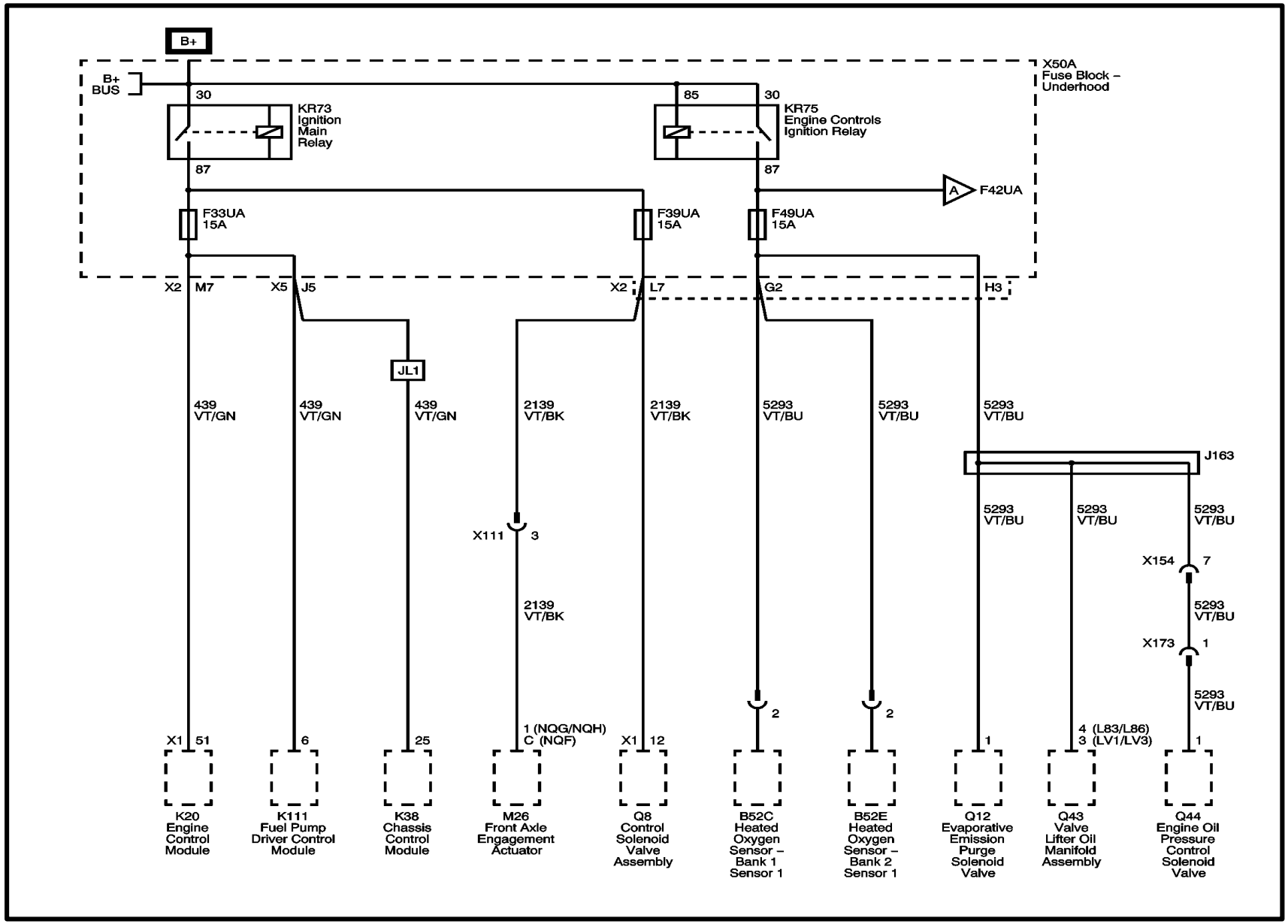
Power Distribution Schematics - F13UA, F16U and F28UA



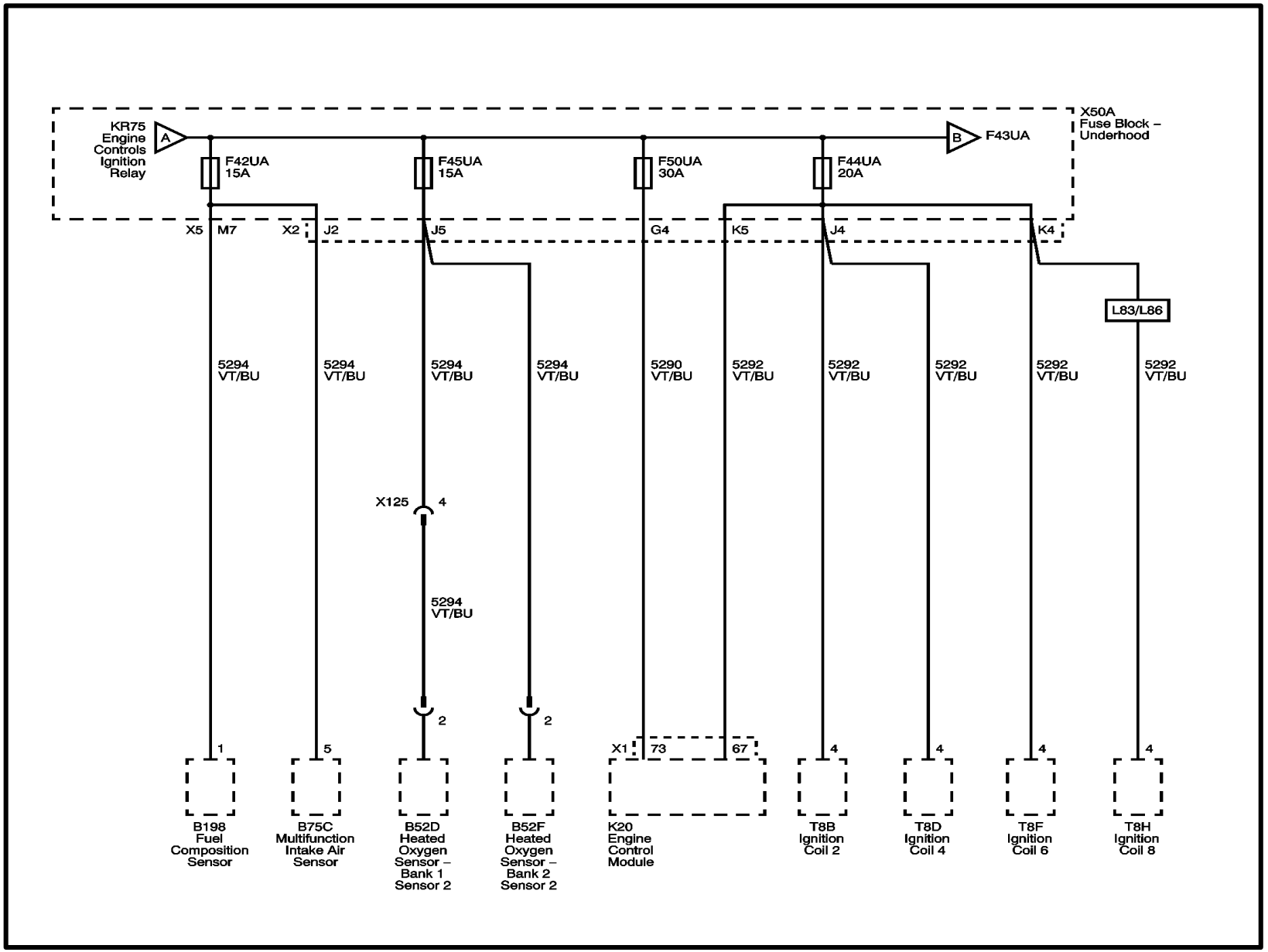
Power Distribution Schematics - F15UA, F32UA, F37UA and F48UA



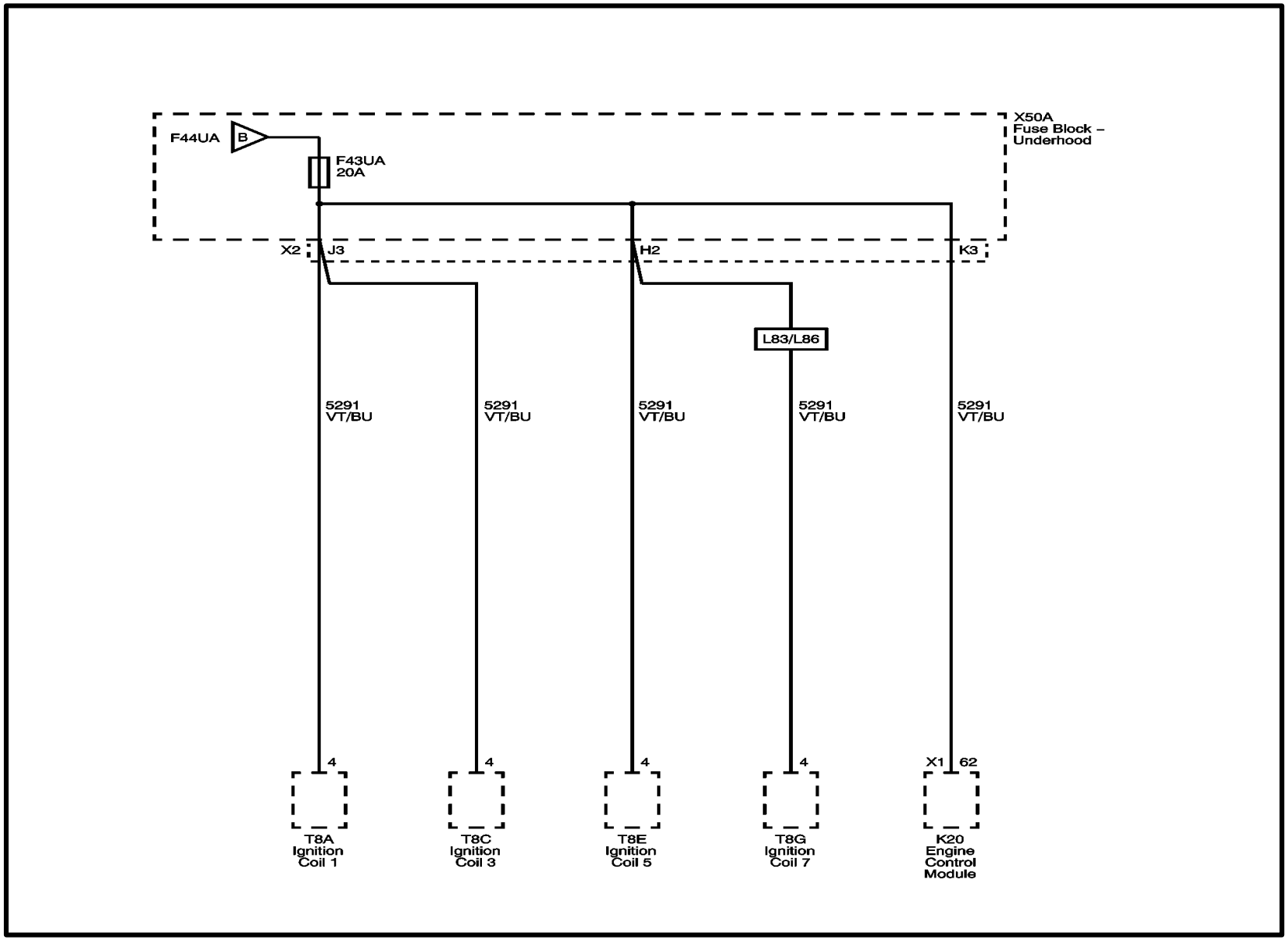
Power Distribution Schematics - F33UA, F39UA and F49UA



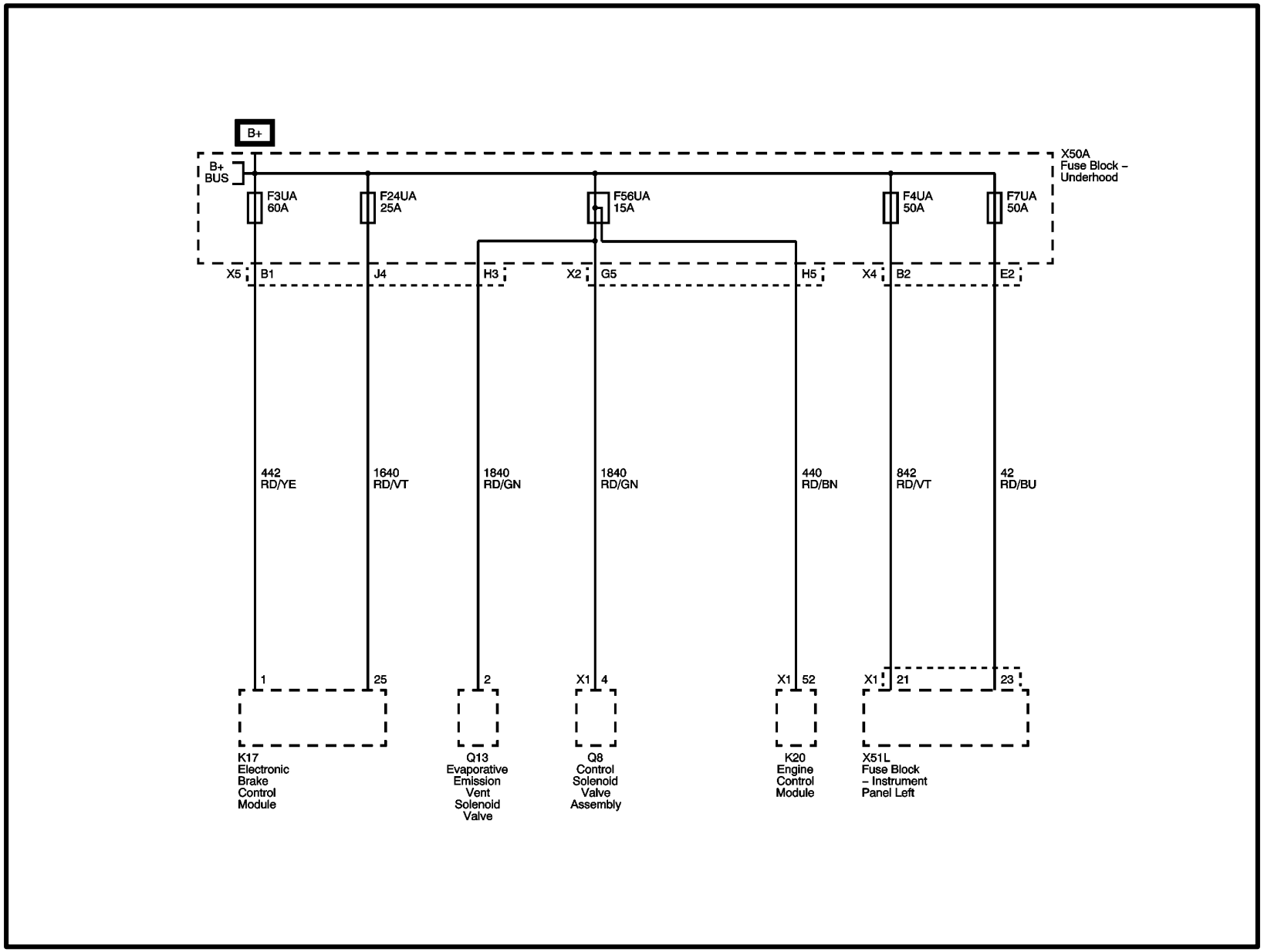
Power Distribution Schematics - F42UA, F44UA, F45UA and F50UA



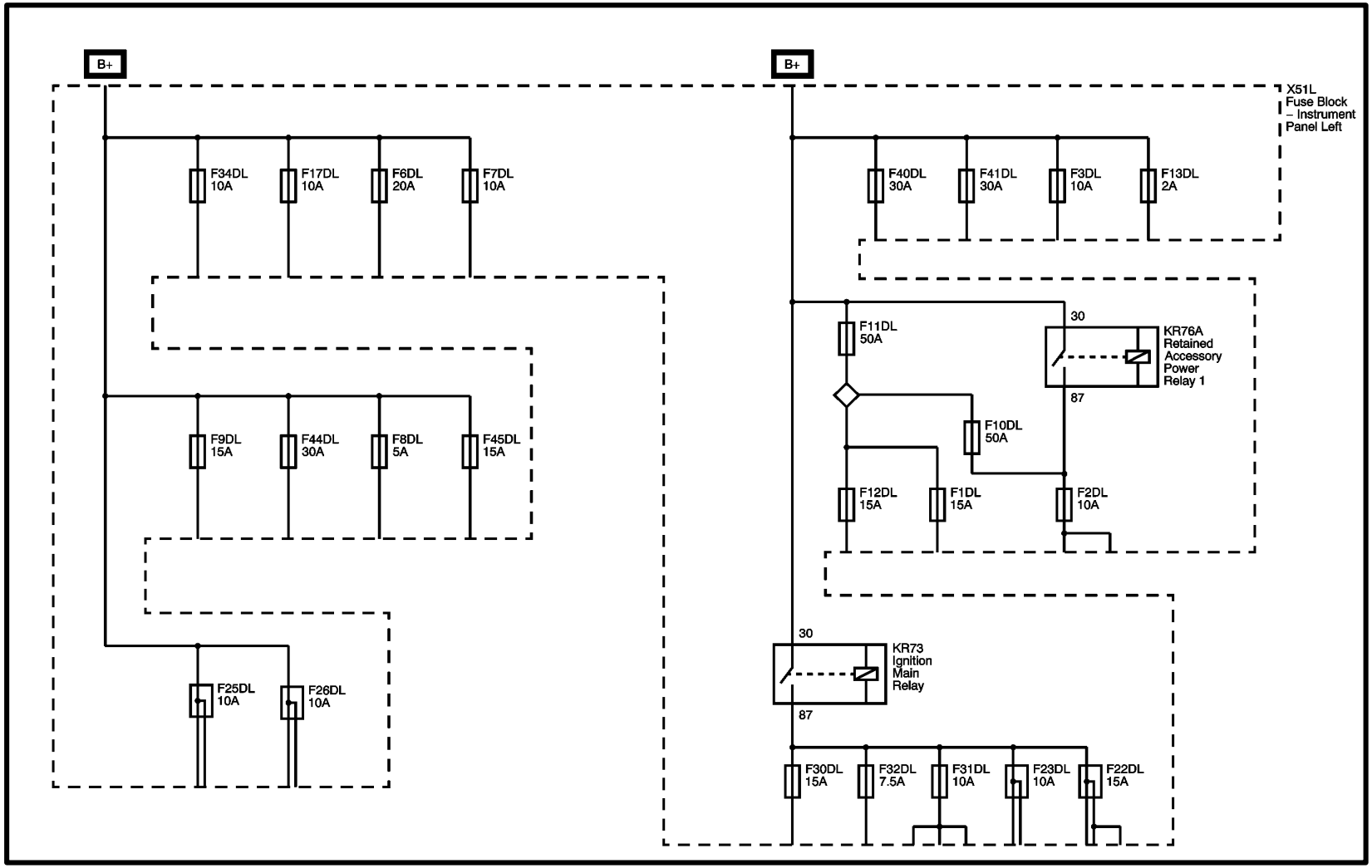
Power Distribution Schematics - F43UA



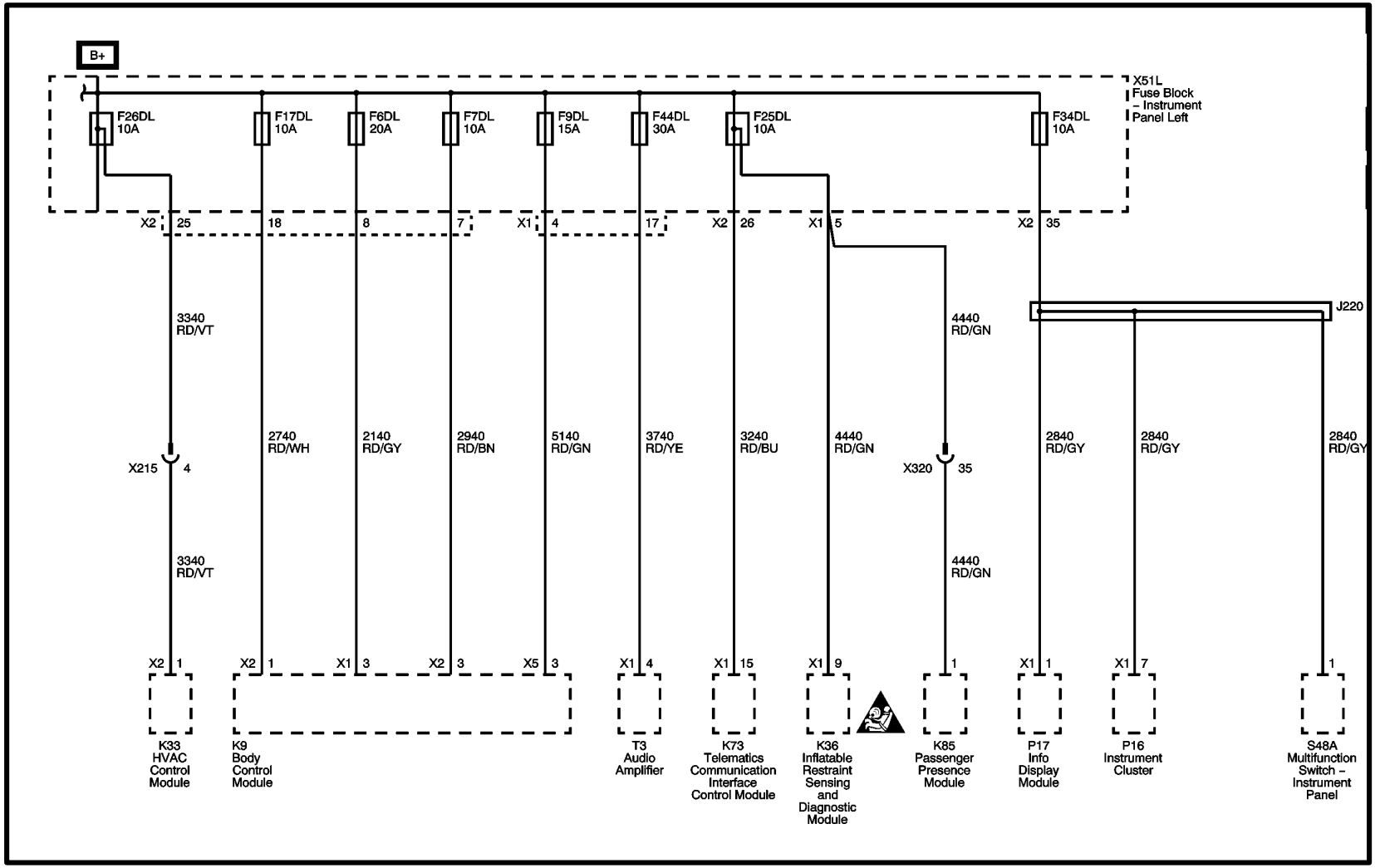
Power Distribution Schematics - F3UA, F4UA, F7UA, F24UA and F56UA



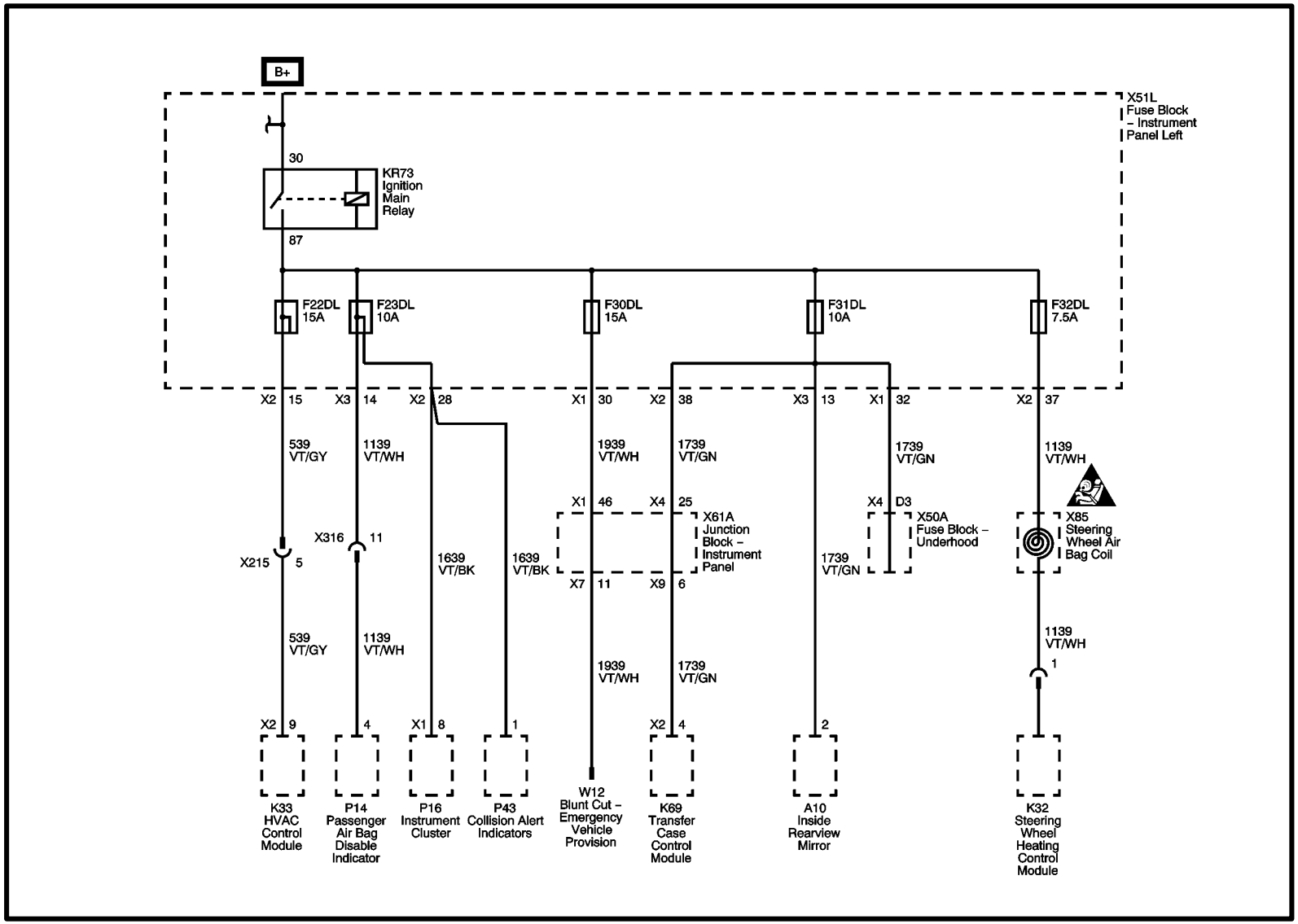
Power Distribution Schematics - X51L Fuse Block - Instrument Panel Left Bussing



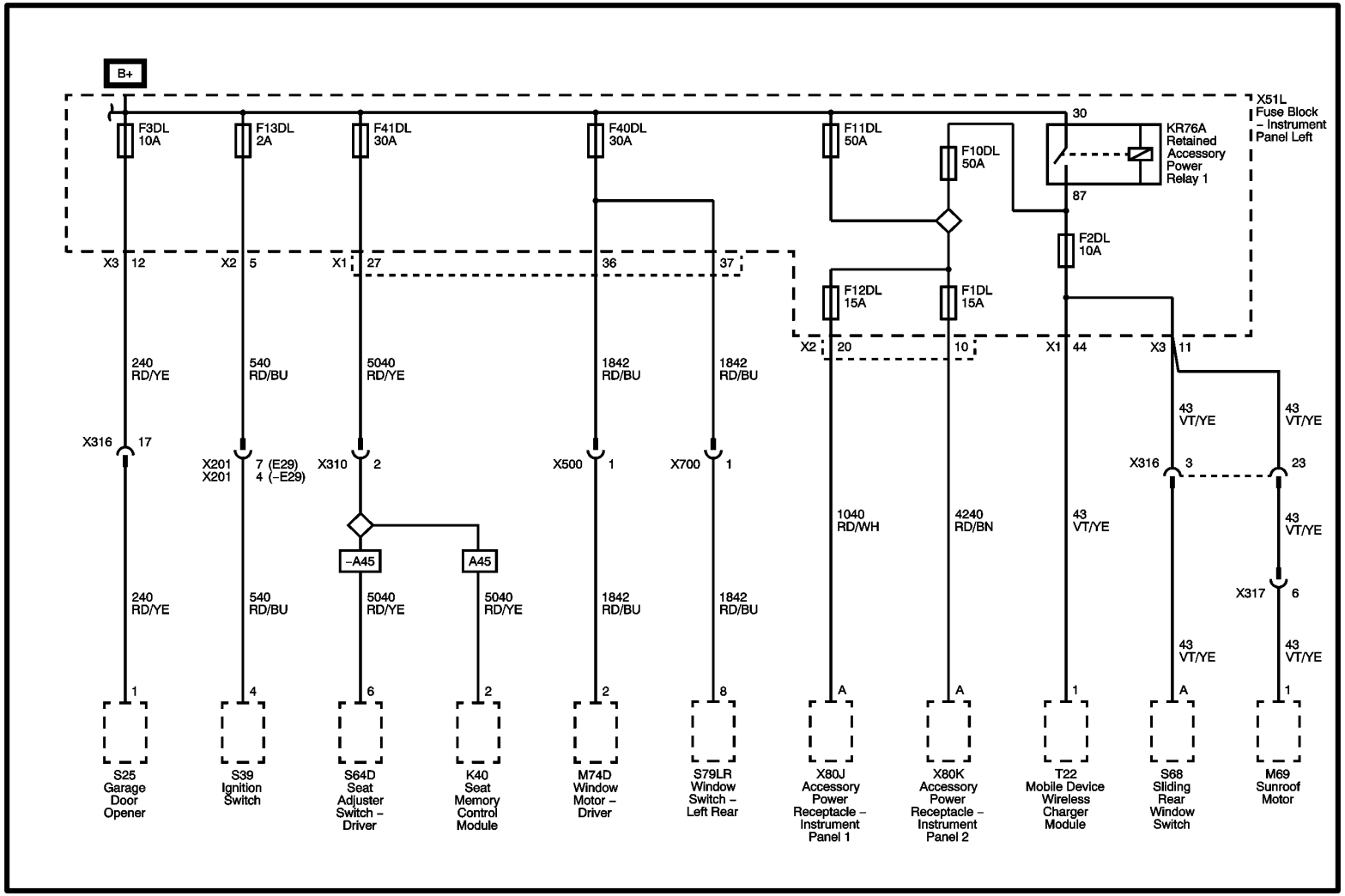
Power Distribution Schematics - F6DL, F7DL, F9DL, F17DL, F25DL, F26DL, F34DL and F44DL



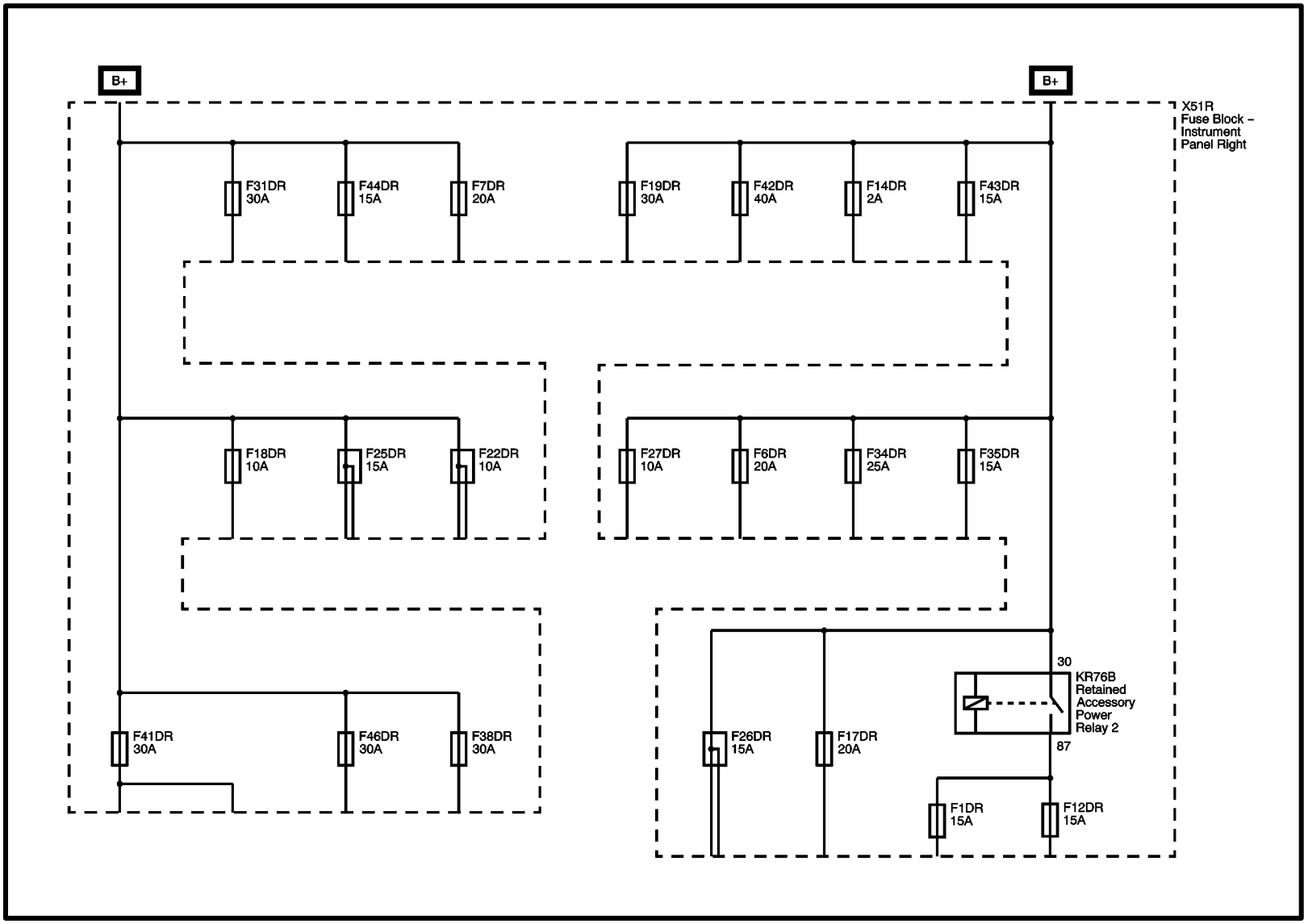
Power Distribution Schematics - F22DL, F23DL, F30DL, F31DL and F32DL



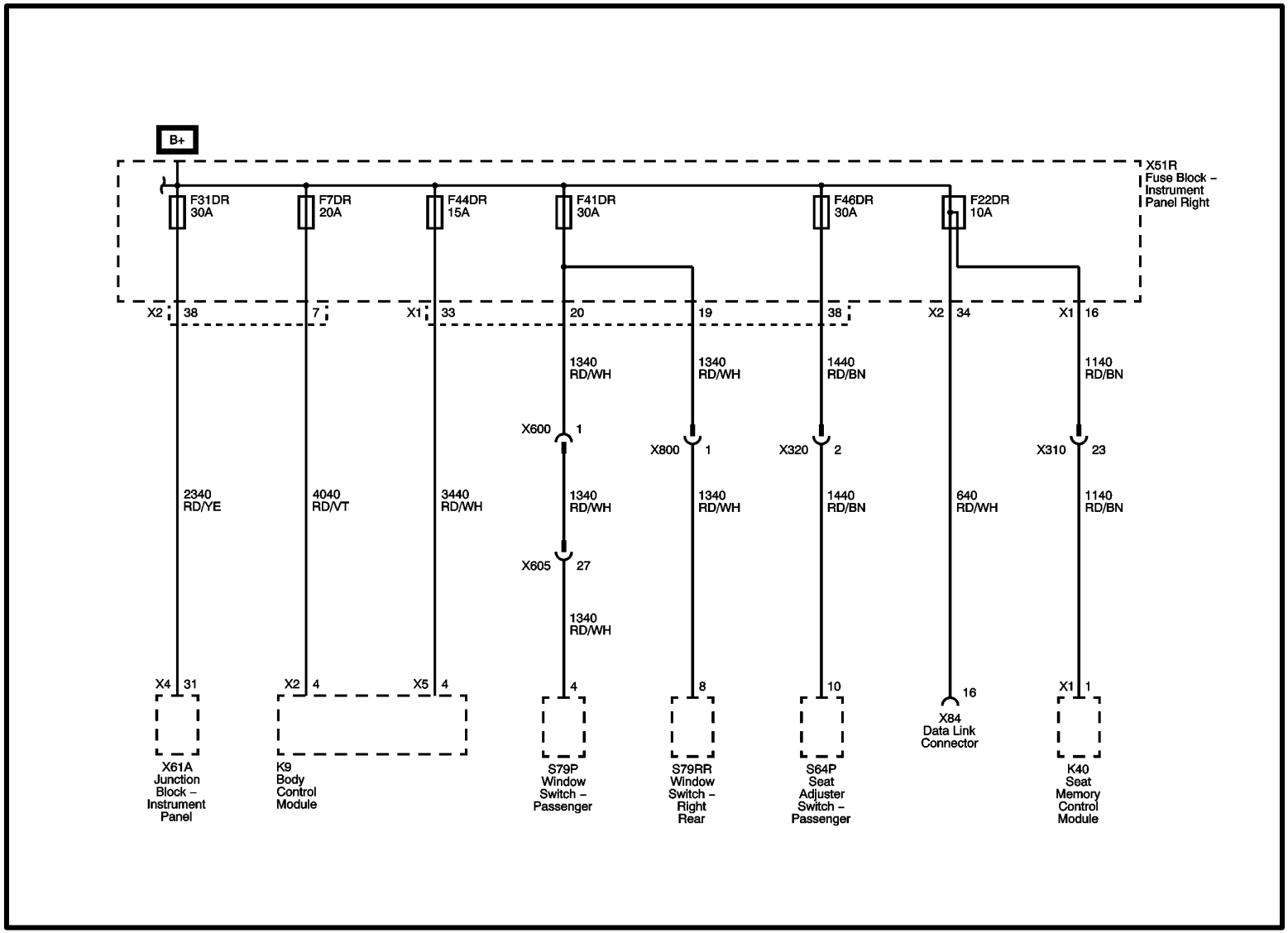
Power Distribution Schematics - F1DL, F2DL, F3DL, F10DL, F11DL, F12DL, F13DL, F40DL and F41DL



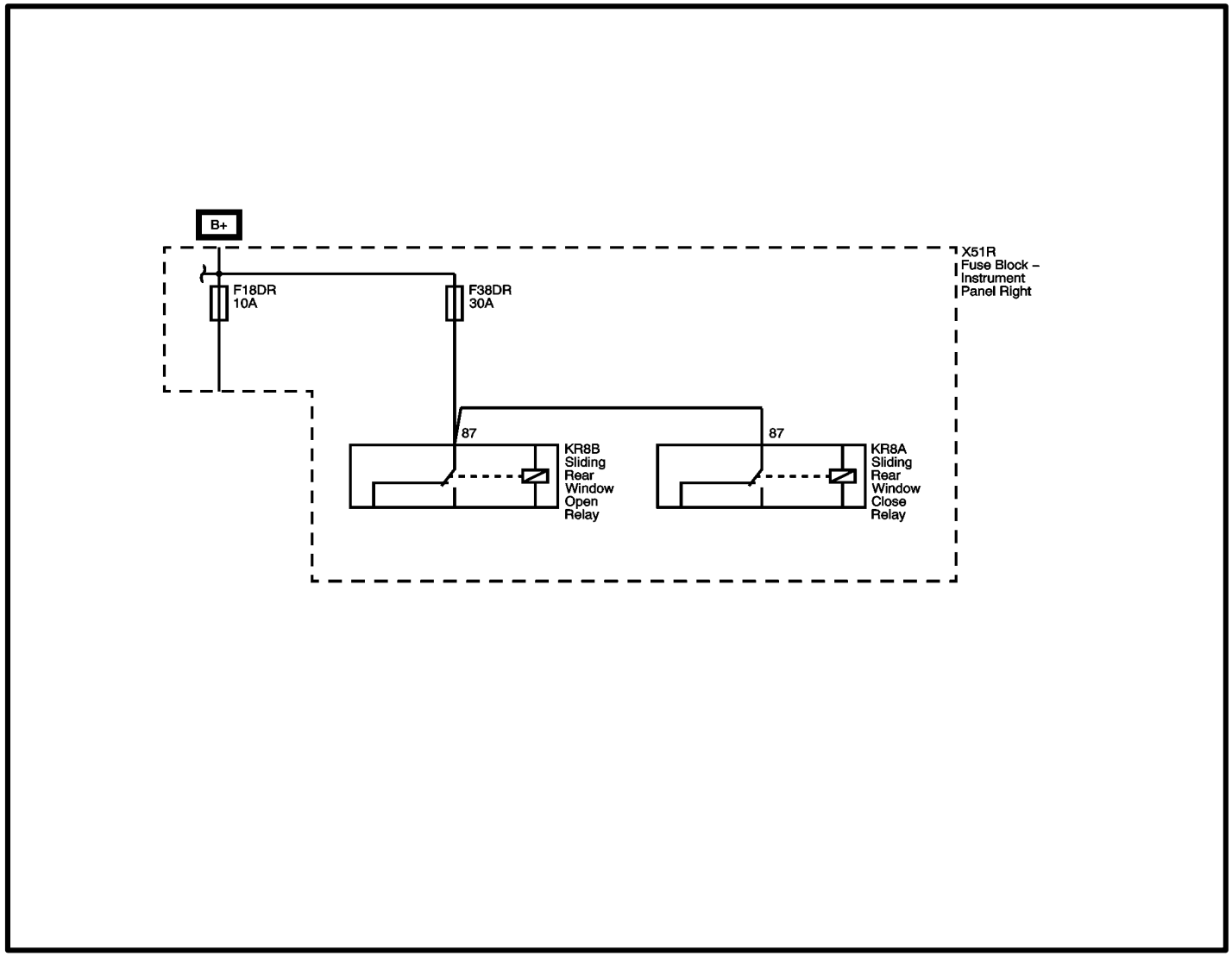
Power Distribution Schematics - X51R Fuse Block - Instrument Panel Right Bussing



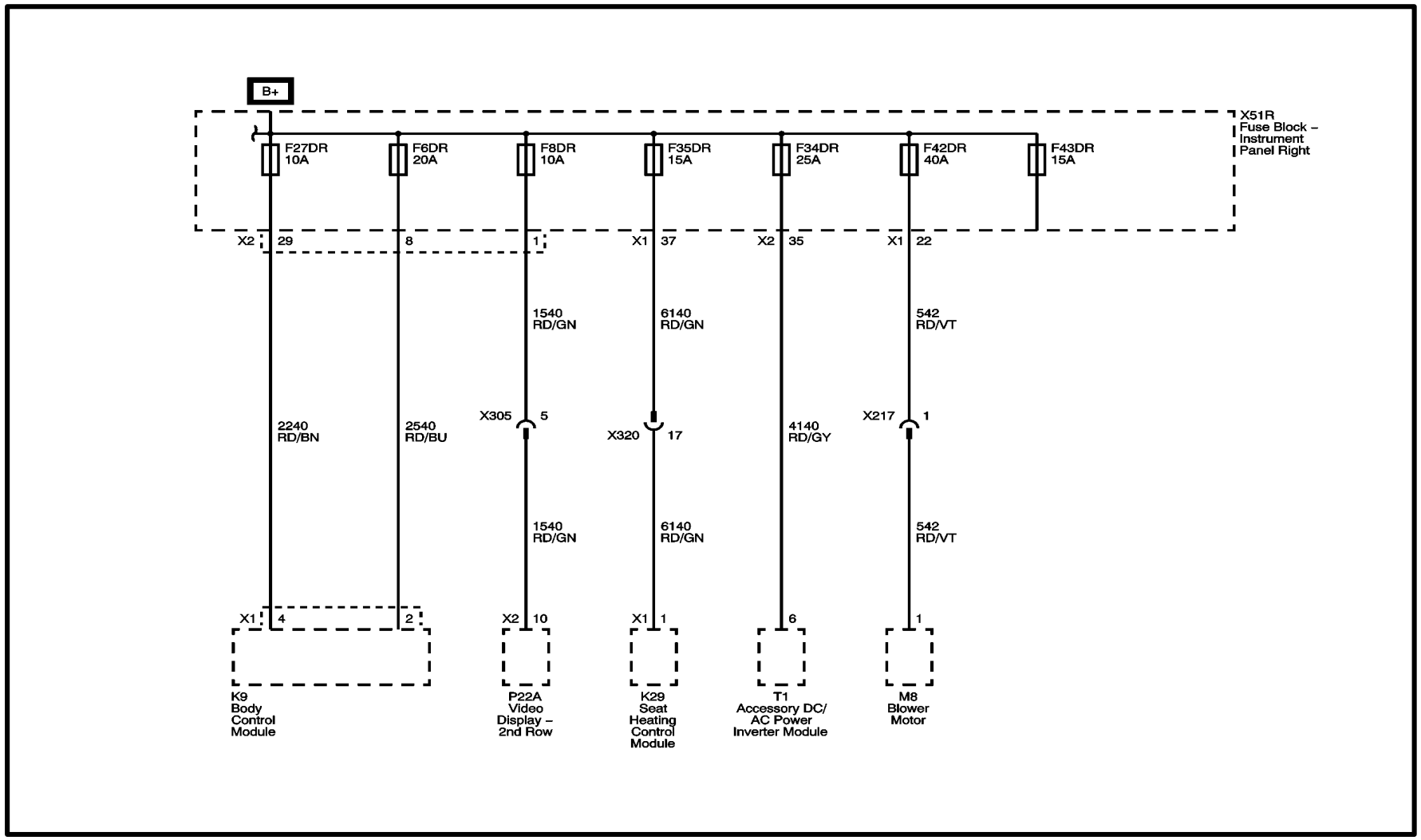
Power Distribution Schematics - F7DR, F22DR, F31DR, F41DR, F44DR and F46DR



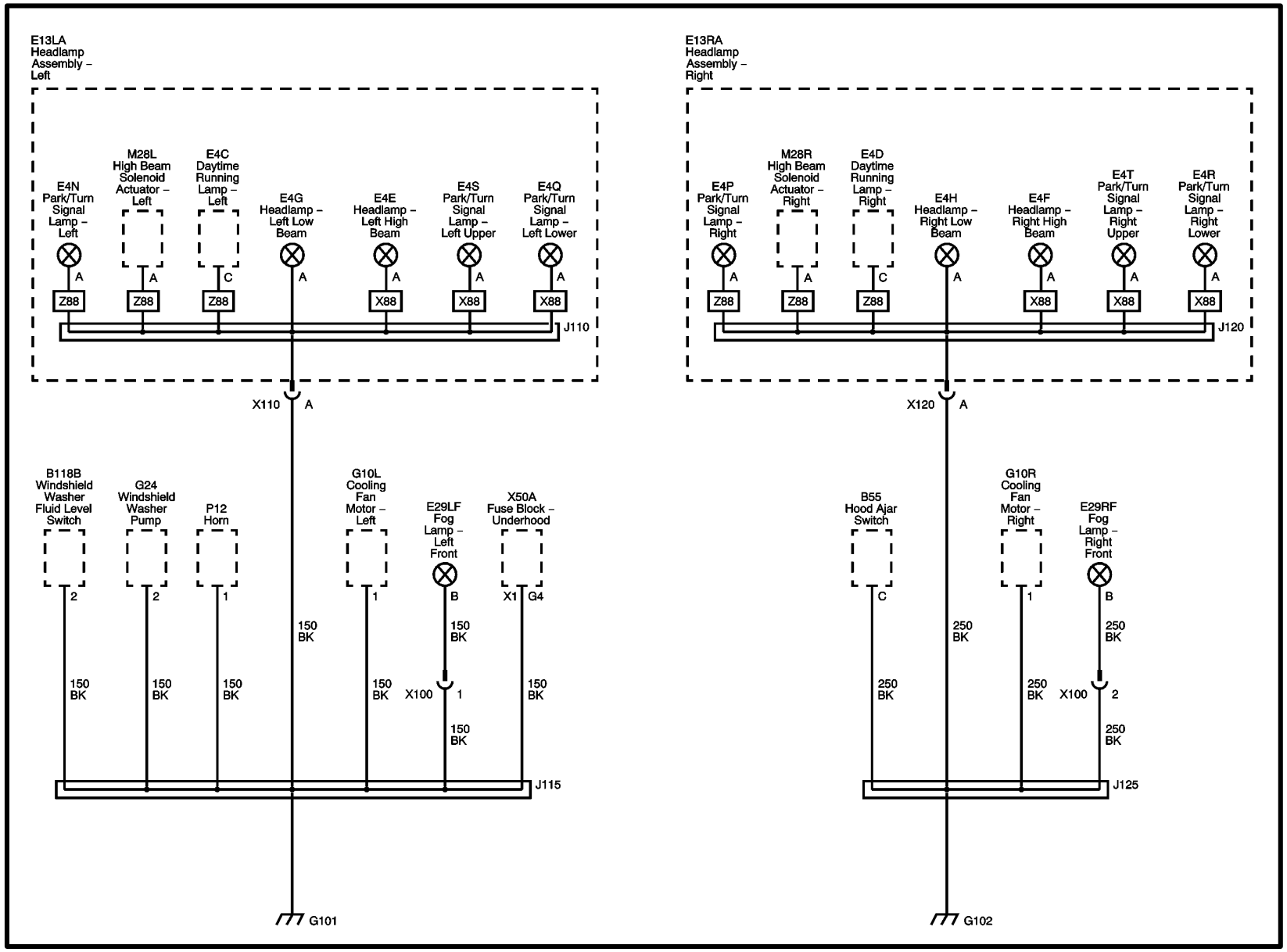
Power Distribution Schematics - F18DR, F25DR and F38DR



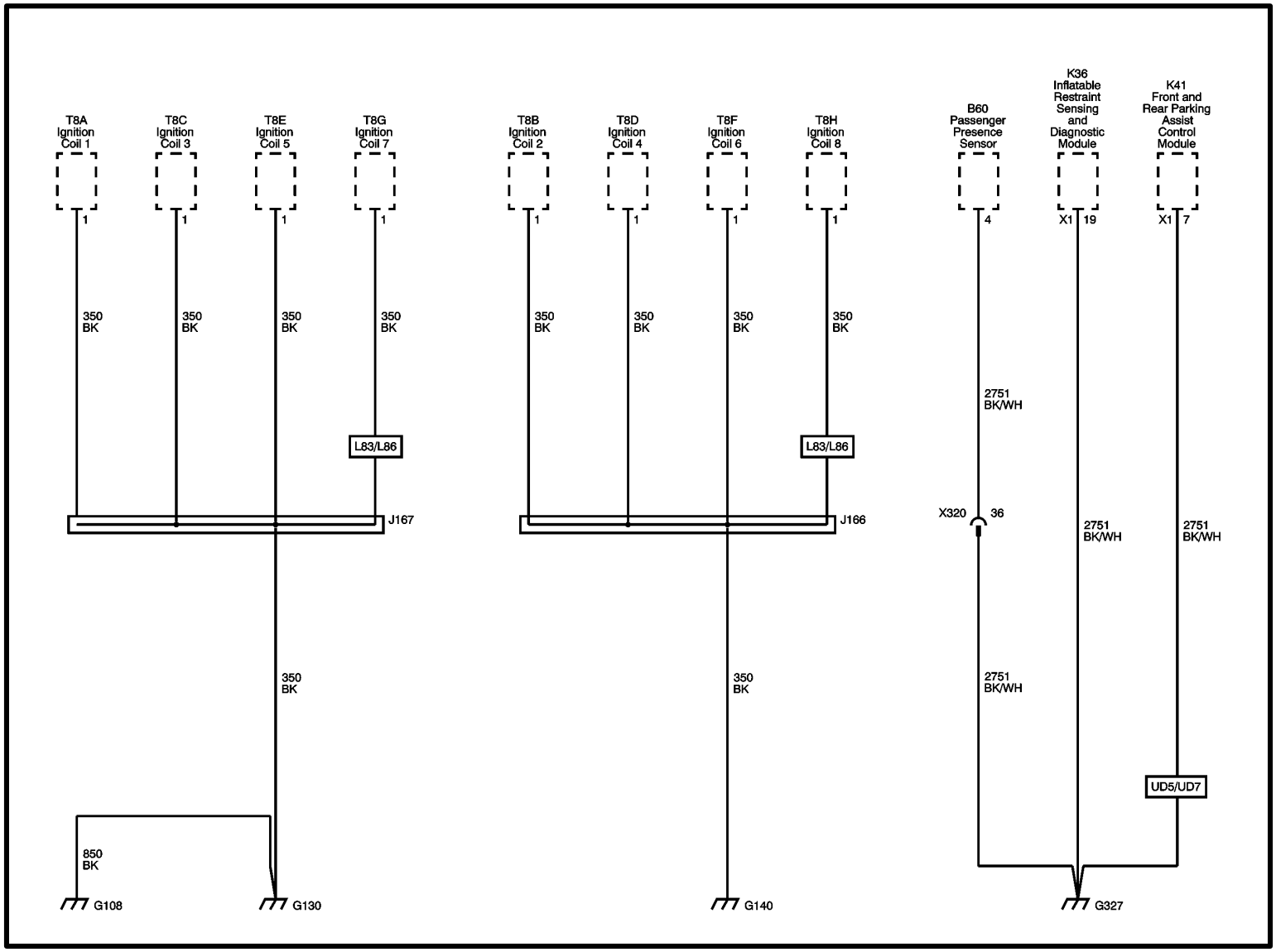
Power Distribution Schematics - F6DR, F8DR, F27DR, F34DR, F35DR, F42DR and F43DR



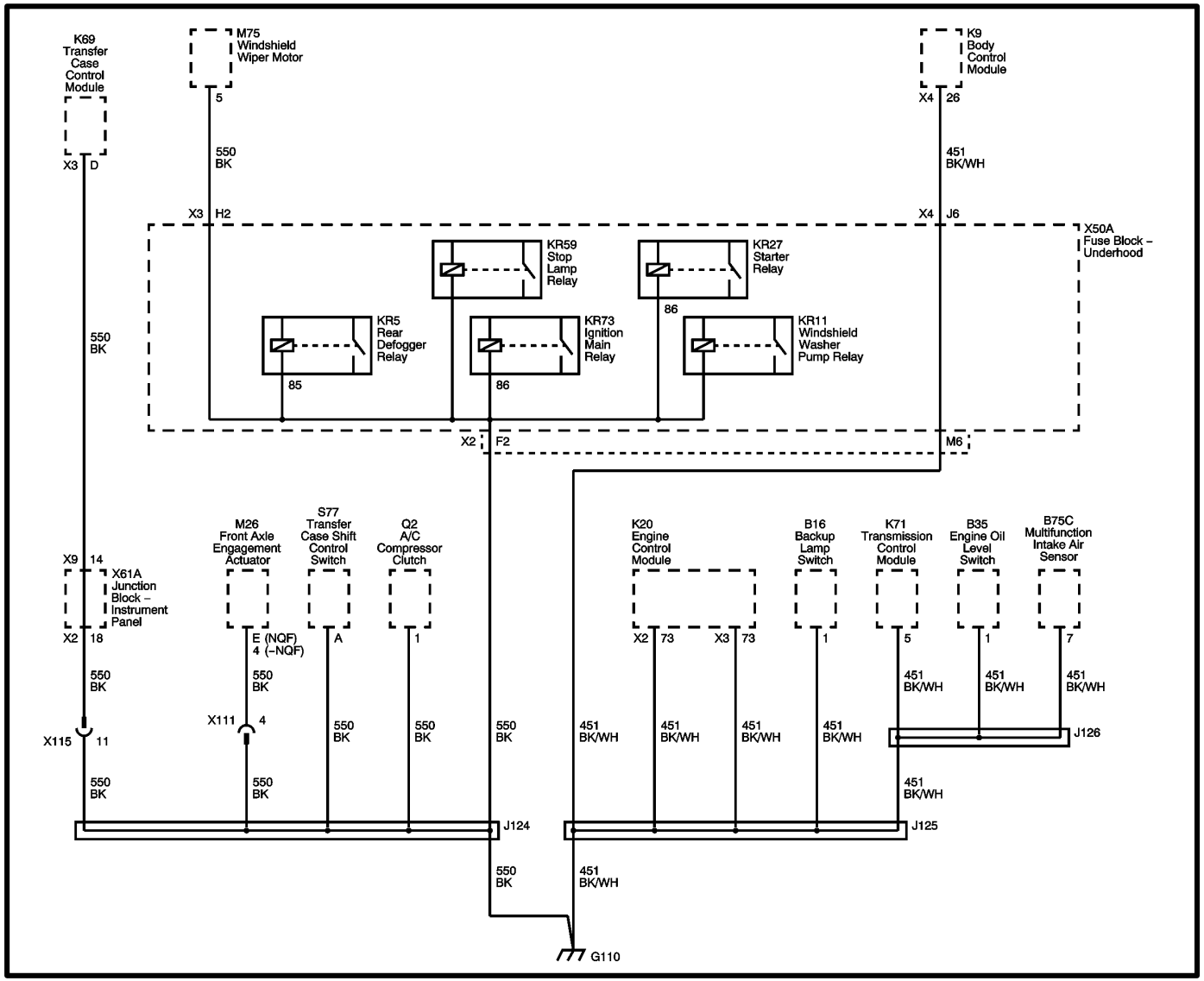
Ground Distribution Schematics - G101 and G102



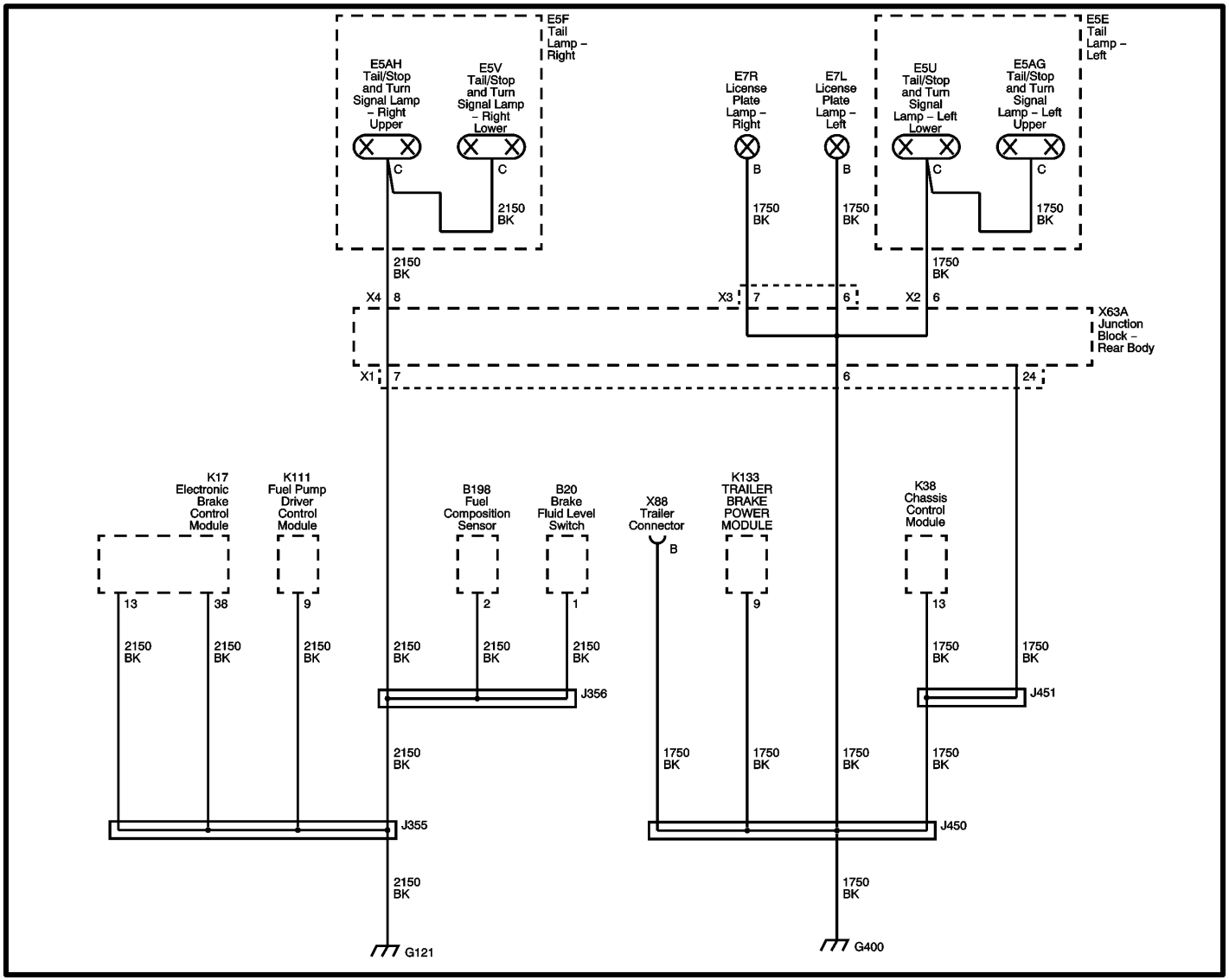
Ground Distribution Schematics - G108, G130, G140 and G327



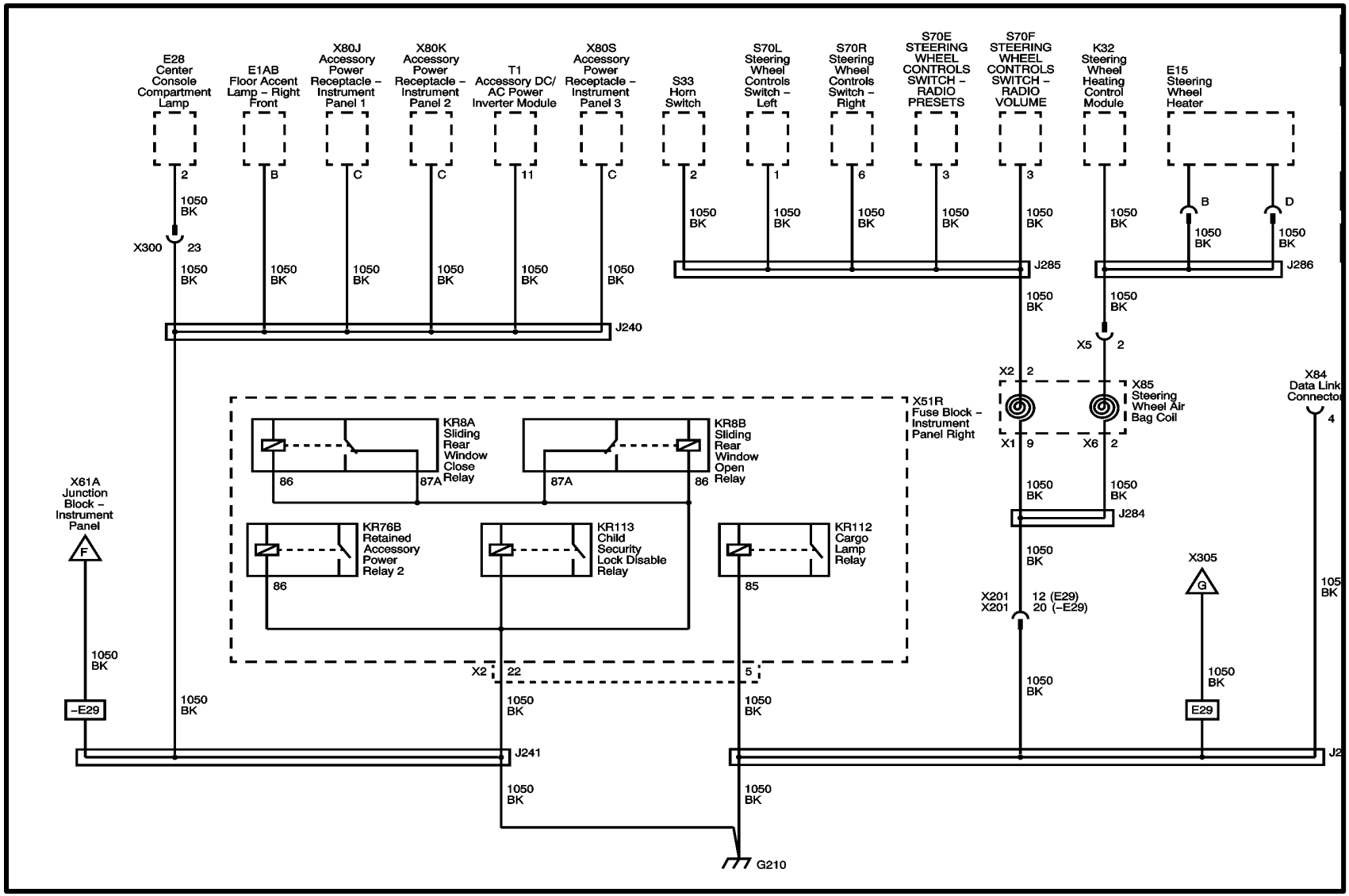
Ground Distribution Schematics - G110



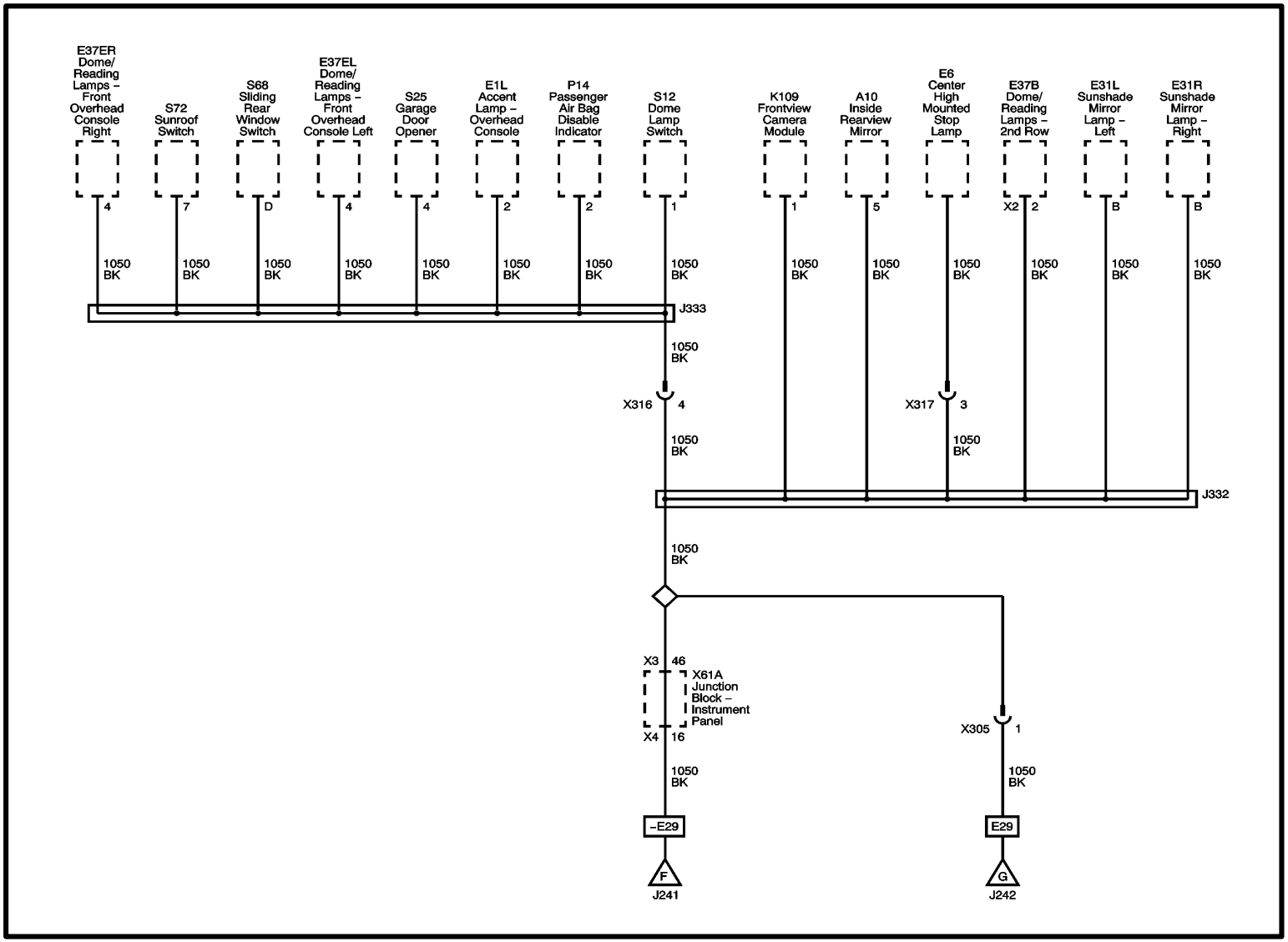
Ground Distribution Schematics - G121 and G400


E5F Tail Lamp – Right
E5AH Tail/Stop and Turn Signal Lamp – Right Upper
E5V Tail/Stop and Turn Signal Lamp – Right Lower
E7R License Plate Lamp – Right
E7L License Plate Lamp – Left
E5E Tail Lamp – Left
E5U Tail/Stop and Turn Signal Lamp – Left Lower
E5AG Tail/Stop and Turn Signal Lamp – Left Upper
X63A Junction Block – Rear Body
K17 Electronic Brake Control Module
K111 Fuel Pump Driver Control Module
B198 Fuel Composition Sensor
B20 Brake Fluid Level Switch
X88 Trailer Connector
K133 TRAILER BRAKE POWER MODULE
K38 Chassis Control Module
J356
J355
J451
J450
G121
G400

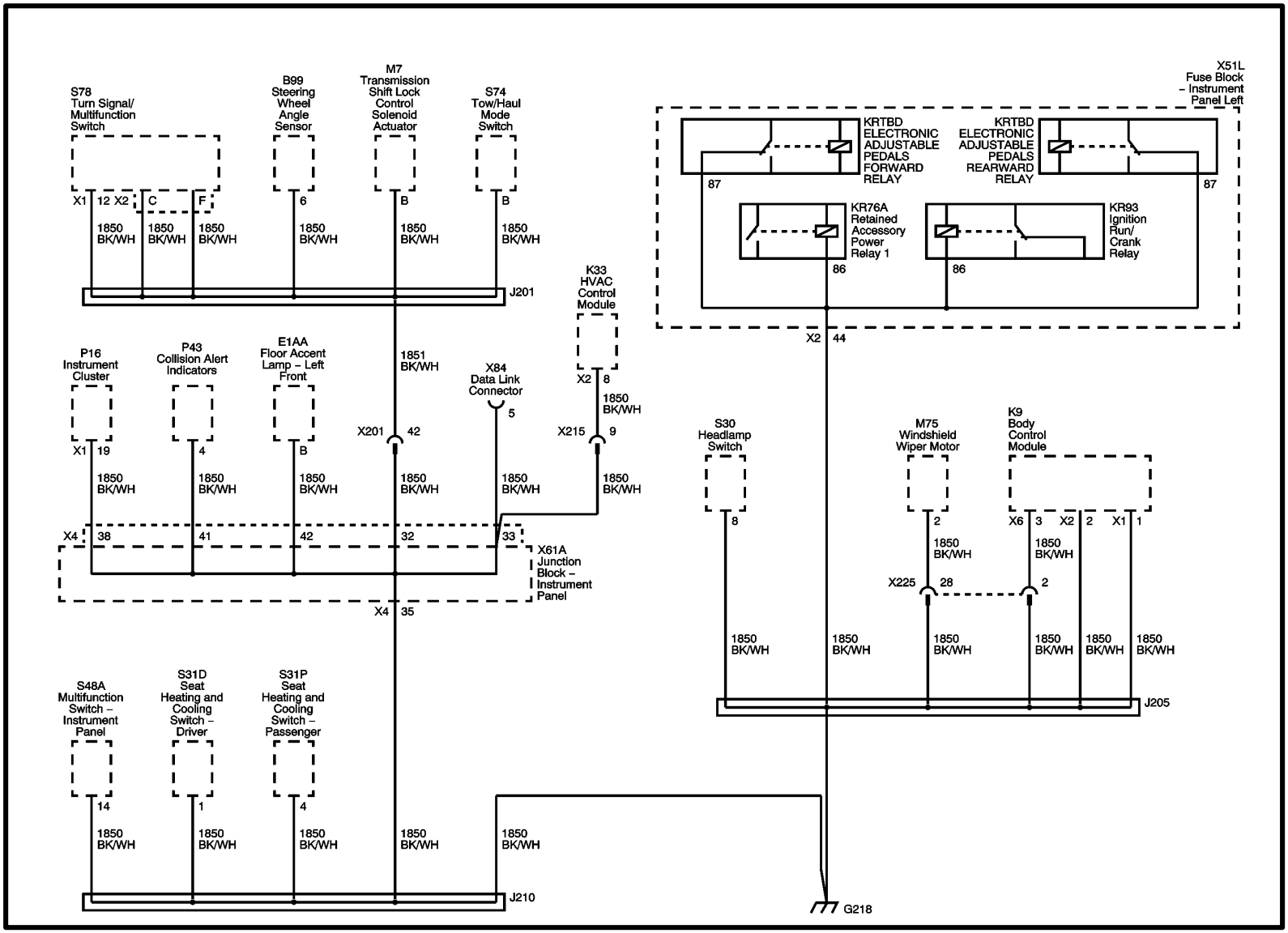
Ground Distribution Schematics - G210 (1 of 2)


E28 Center Console Compartment Lamp
E1AB Floor Accent Lamp – Right Front
X80J Accessory Power Receptacle – Instrument Panel 1
X80K Accessory Power Receptacle – Instrument Panel 2
T1 Accessory DC/ AC Power Inverter Module
X80S Accessory Power Receptacle – Instrument Panel 3
S33 Horn Switch
S70L Steering Wheel Controls Switch – Left
S70R Steering Wheel Controls Switch – Right
S70E STEERING WHEEL CONTROLS SWITCH – RADIO PRESETS
S70F STEERING WHEEL CONTROLS SWITCH – RADIO VOLUME
K32 Steering Wheel Heating Control Module
E15 Steering Wheel Heater
X300
J240
J285
J286
X5
X2
X85 Steering Wheel Air Bag Coil
X84 Data Link Connector
X51R Fuse Block – Instrument Panel Right
KR8A Sliding Rear Window Close Relay
KR8B Sliding Rear Window Open Relay
KR76B Retained Accessory Power Relay 2
KR113 Child Security Lock Disable Relay
KR112 Cargo Lamp Relay
X61A Junction Block – Instrument Panel
J284
X305
X201
12 (E29)
20 (–E29)
–E29
E29
J241
G210
1050 BK

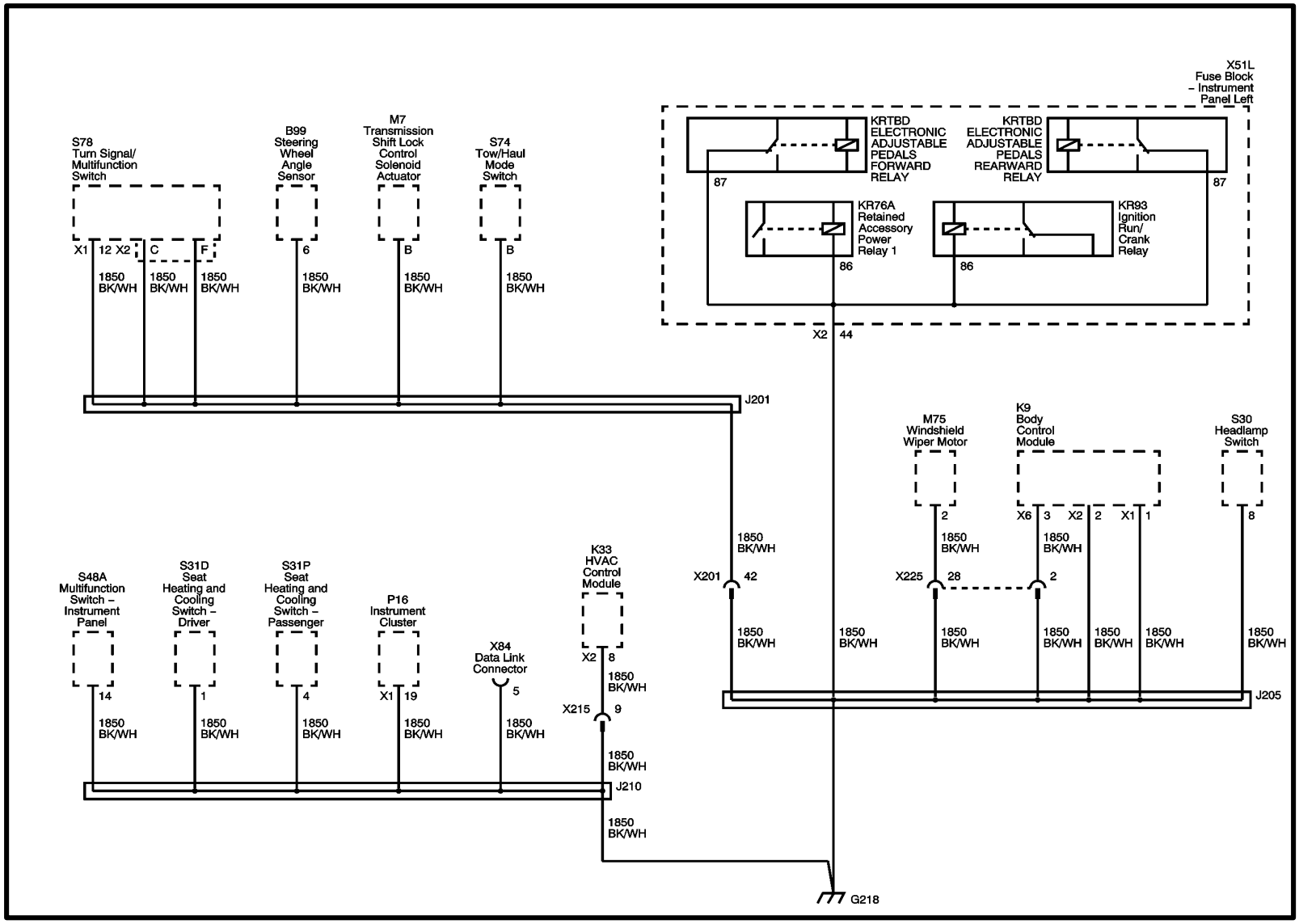
Ground Distribution Schematics - G210 (2 of 2)



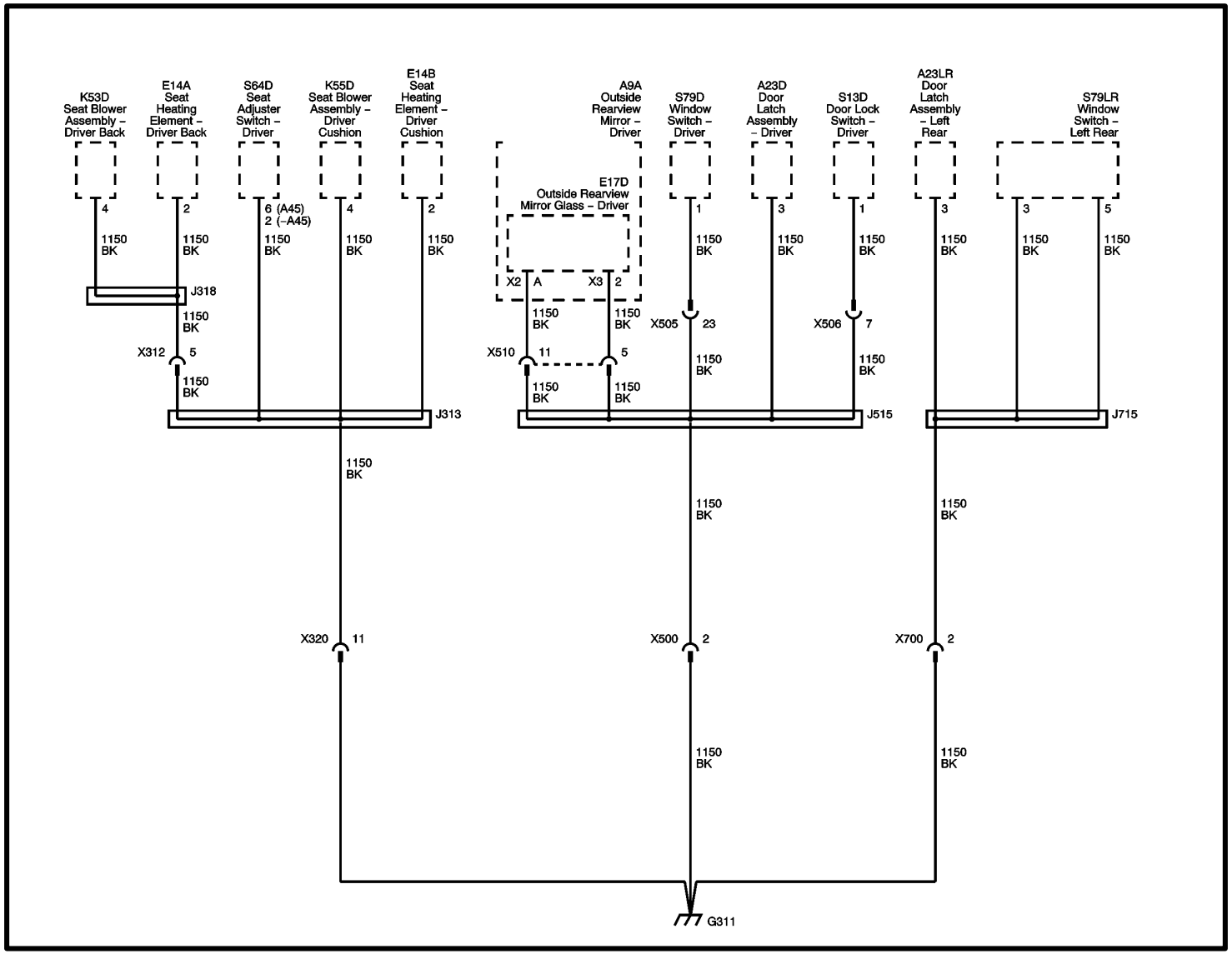
Ground Distribution Schematics - G218 (except E29)



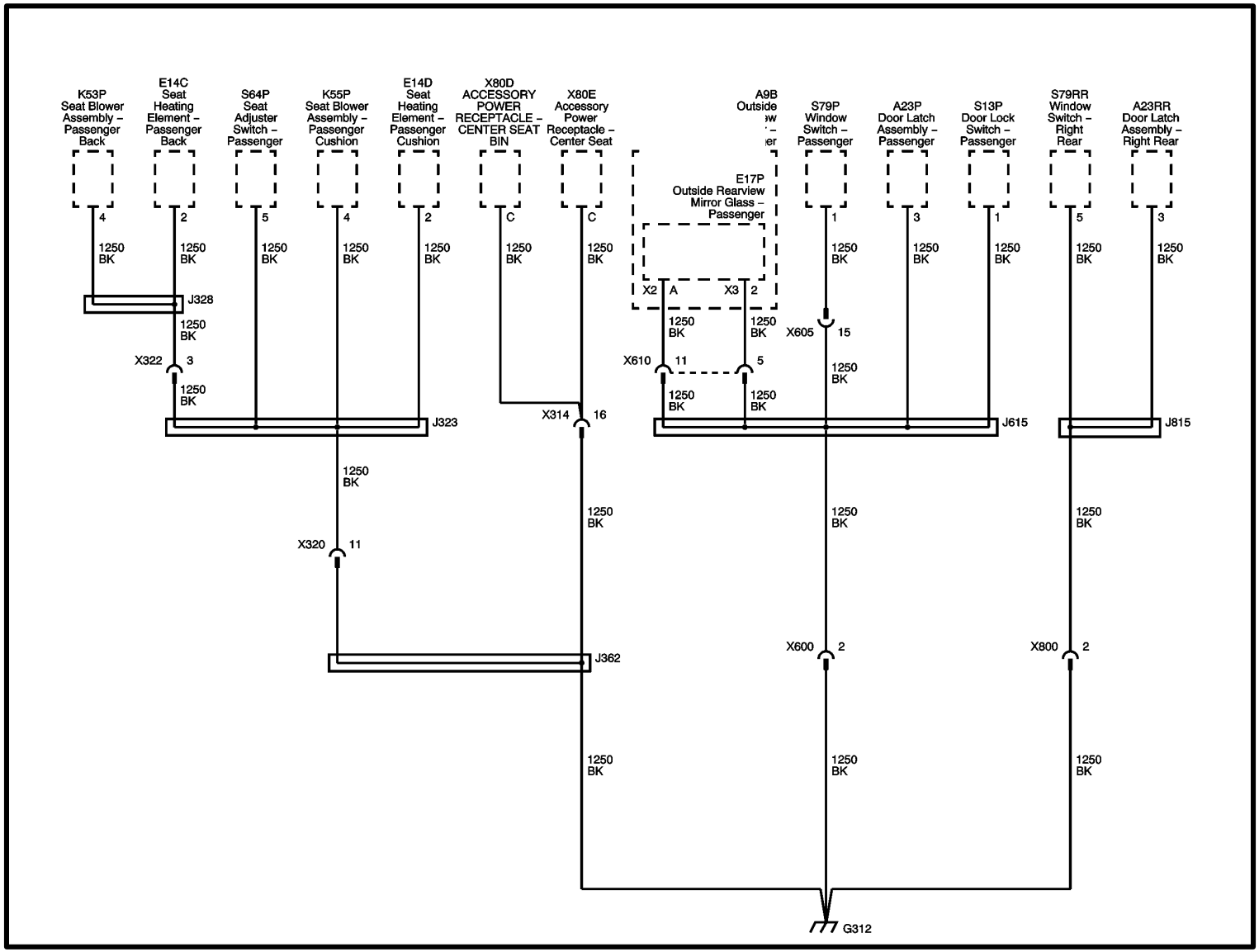
Ground Distribution Schematics - G218 (E29)



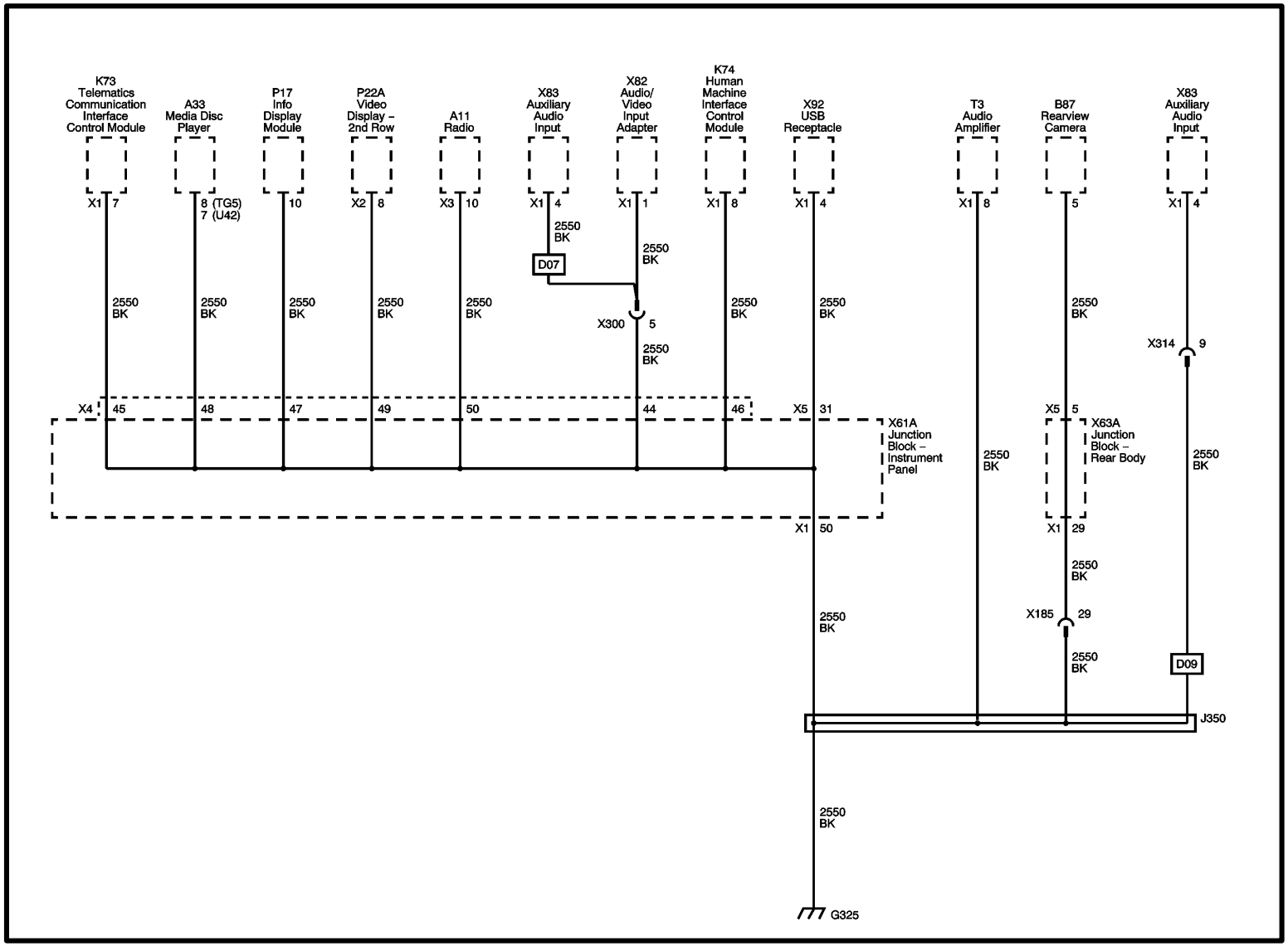
Ground Distribution Schematics - G311



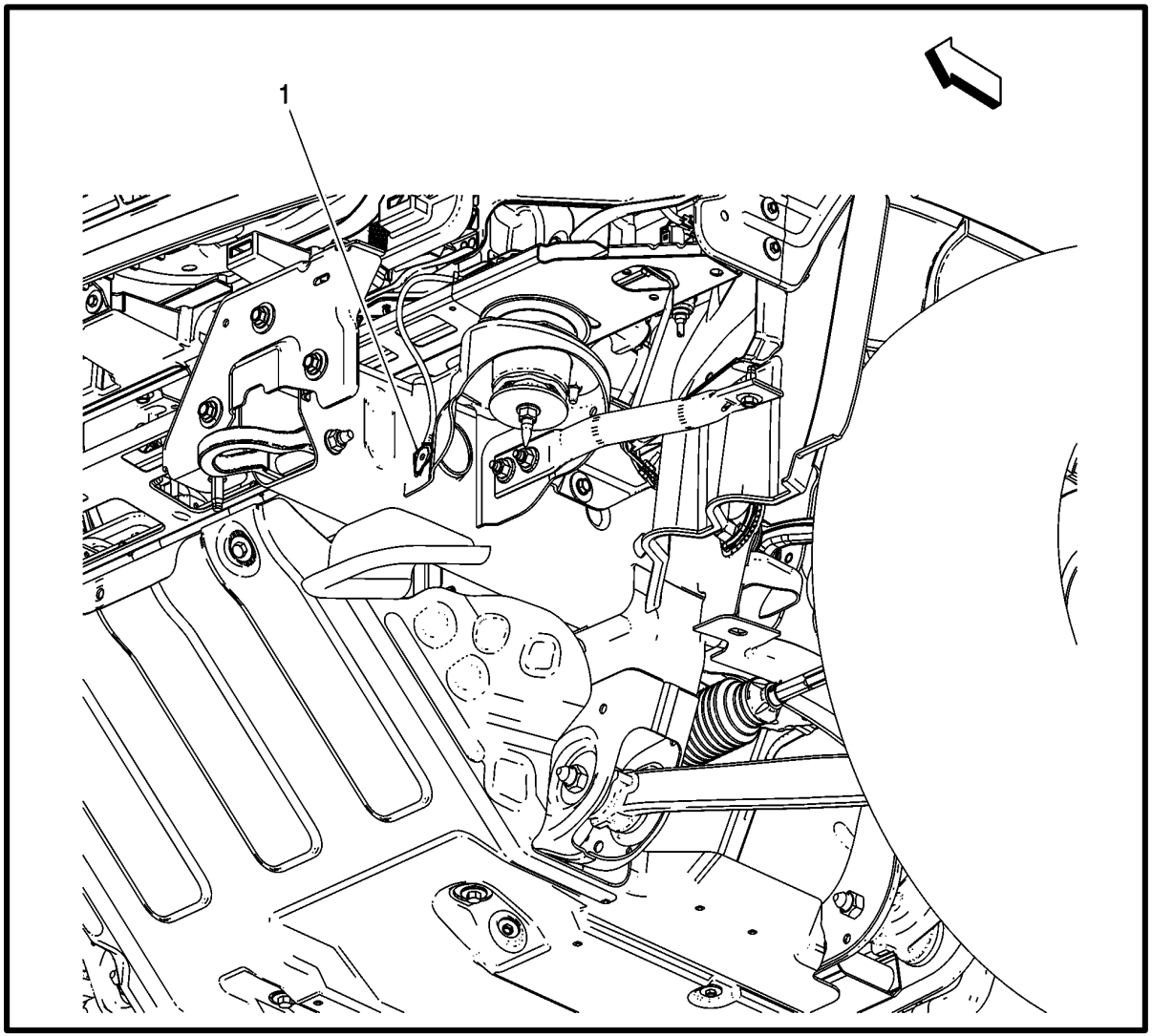
Ground Distribution Schematics - G312



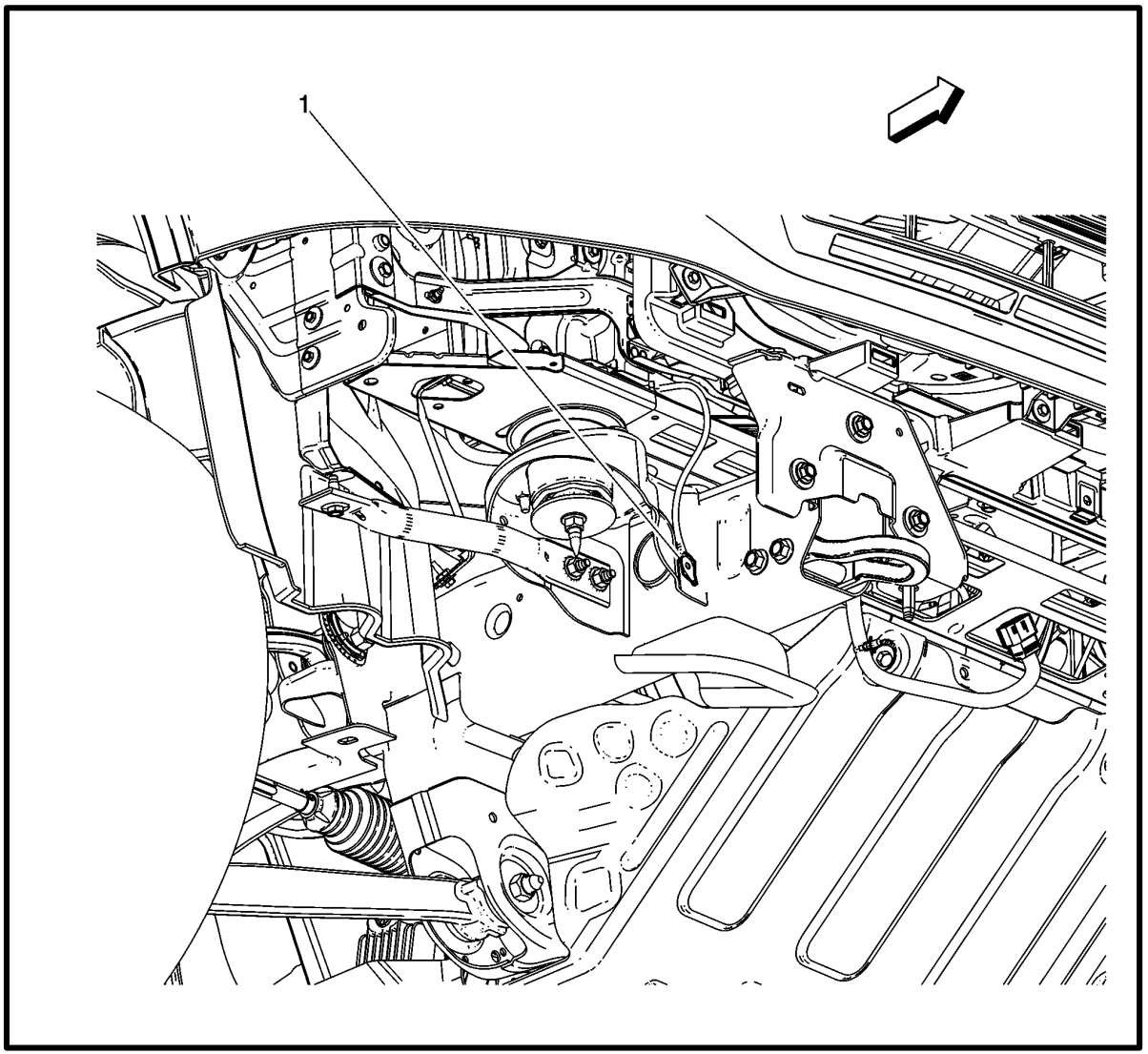
Ground Distribution Schematics - G325



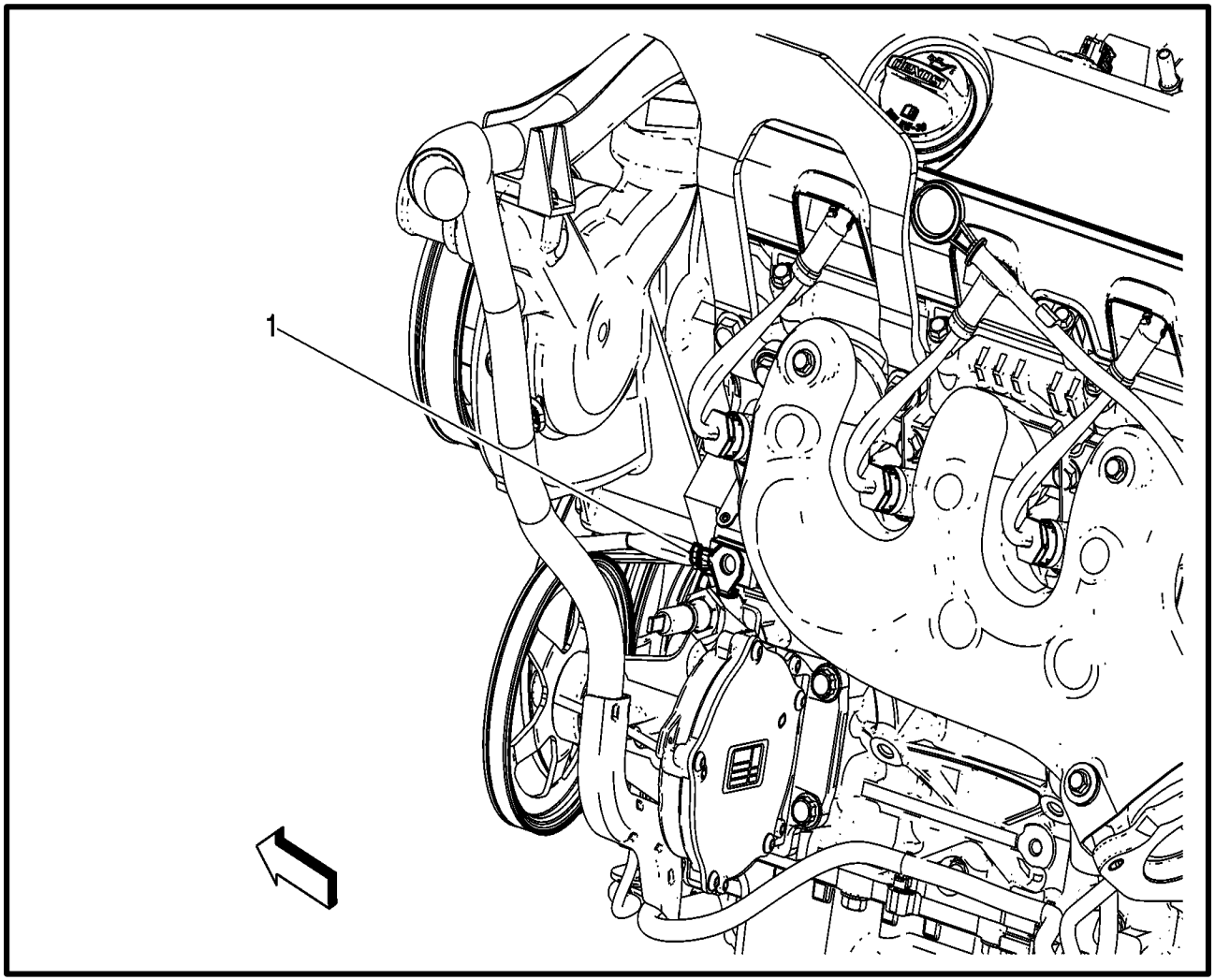
Ground Location Views – G101



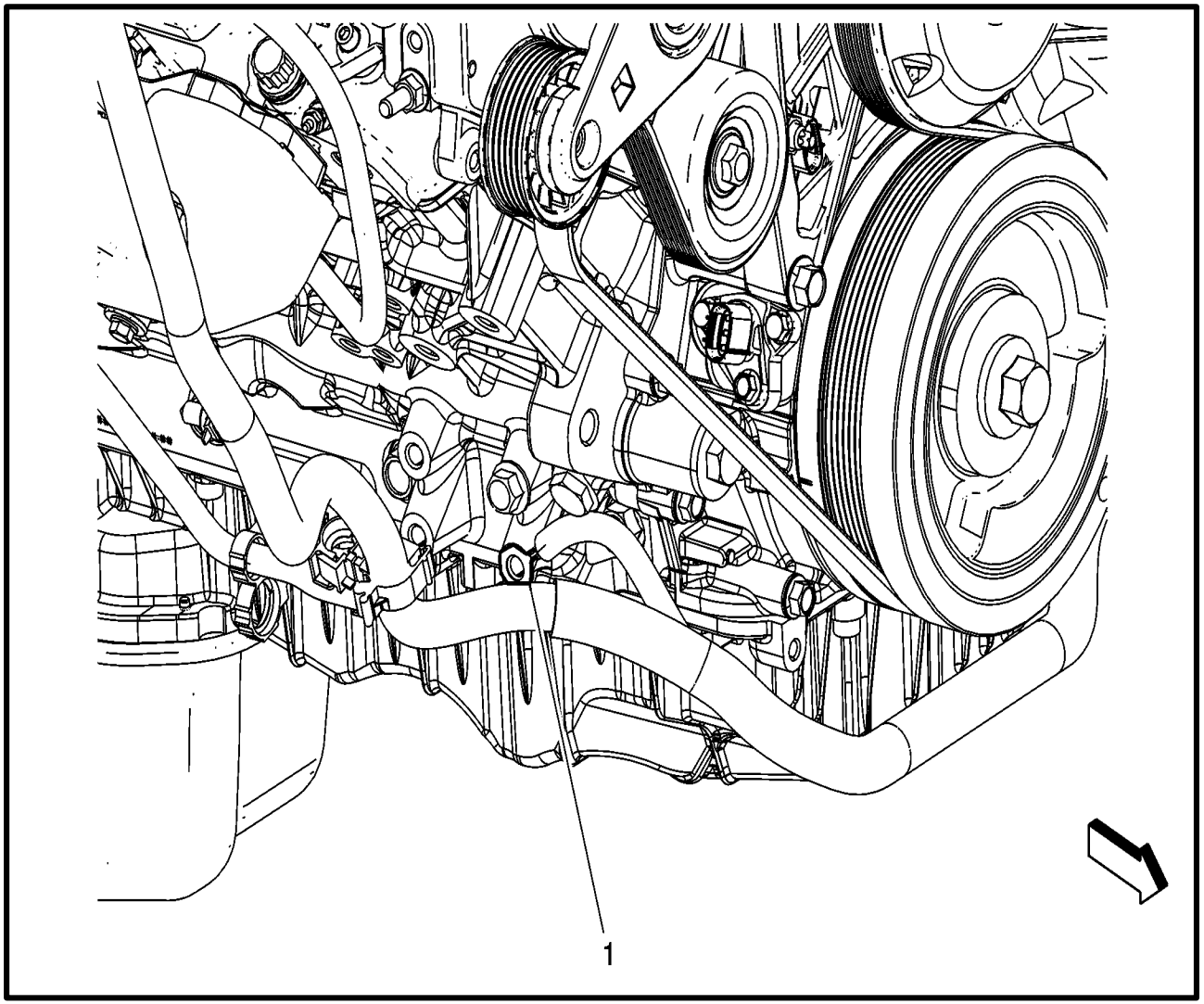
Ground Location Views G102



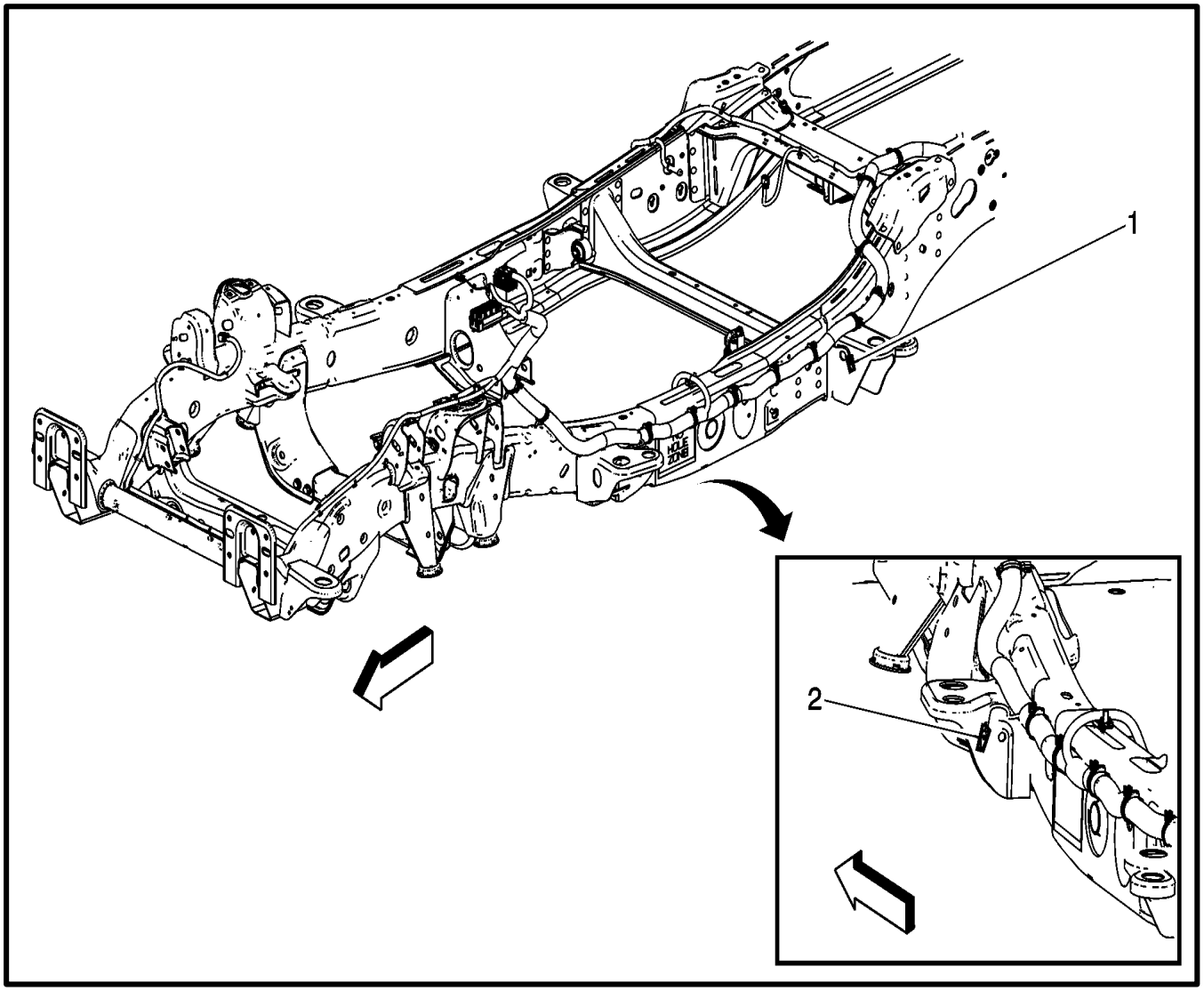
Ground Location Views G110



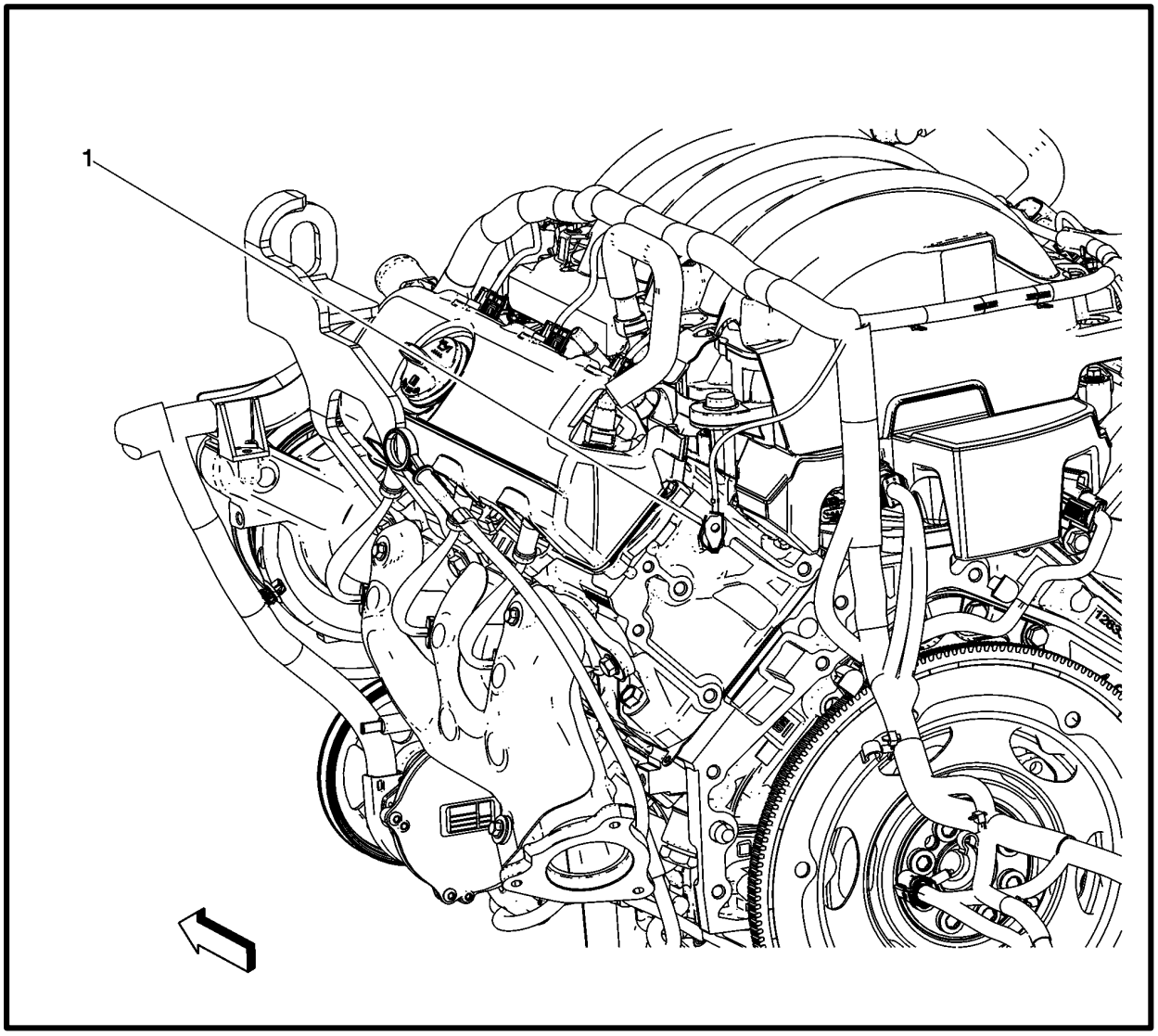
Ground Location Views G120



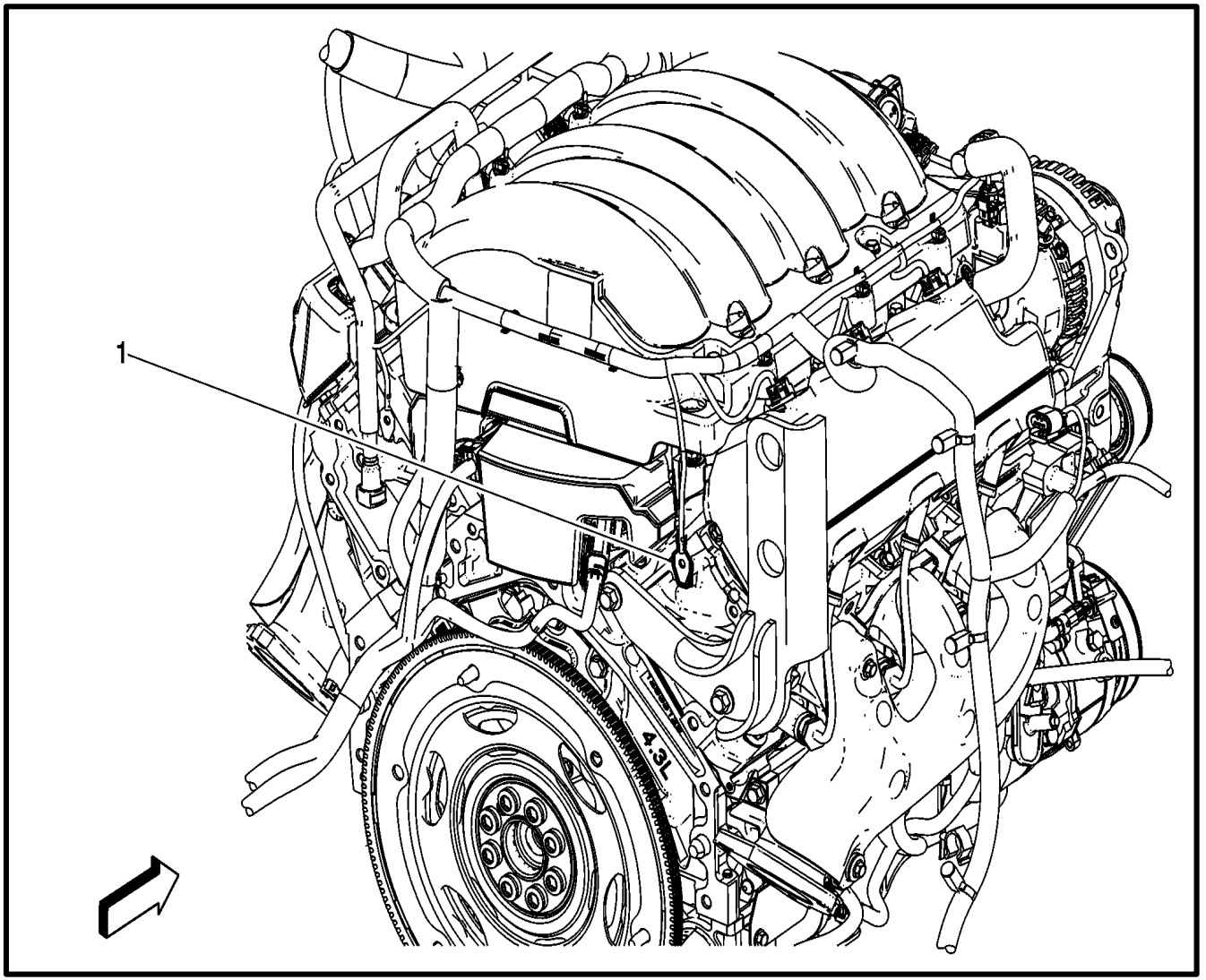
Ground Location Views G121 and G400



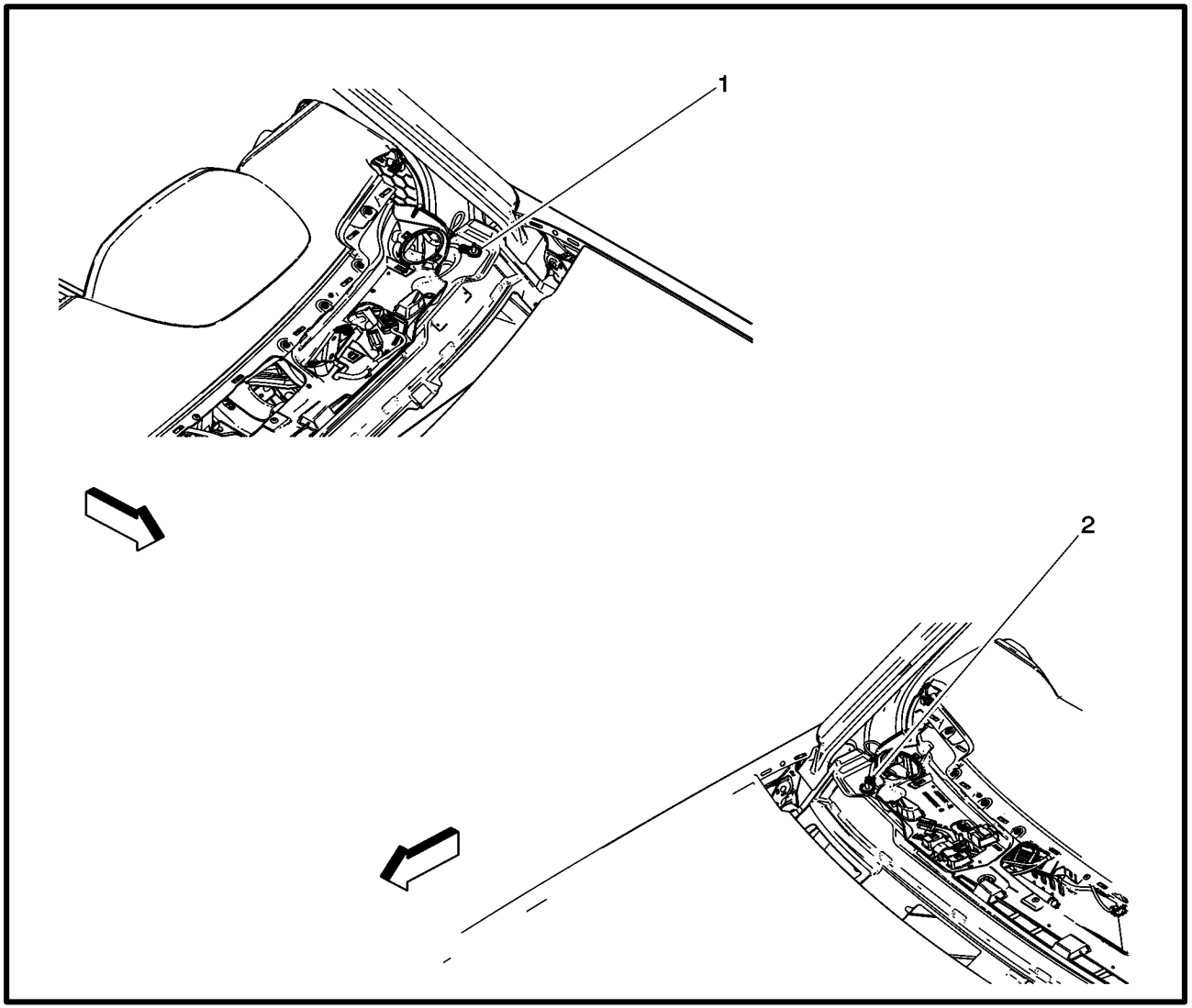
Ground Location Views G130



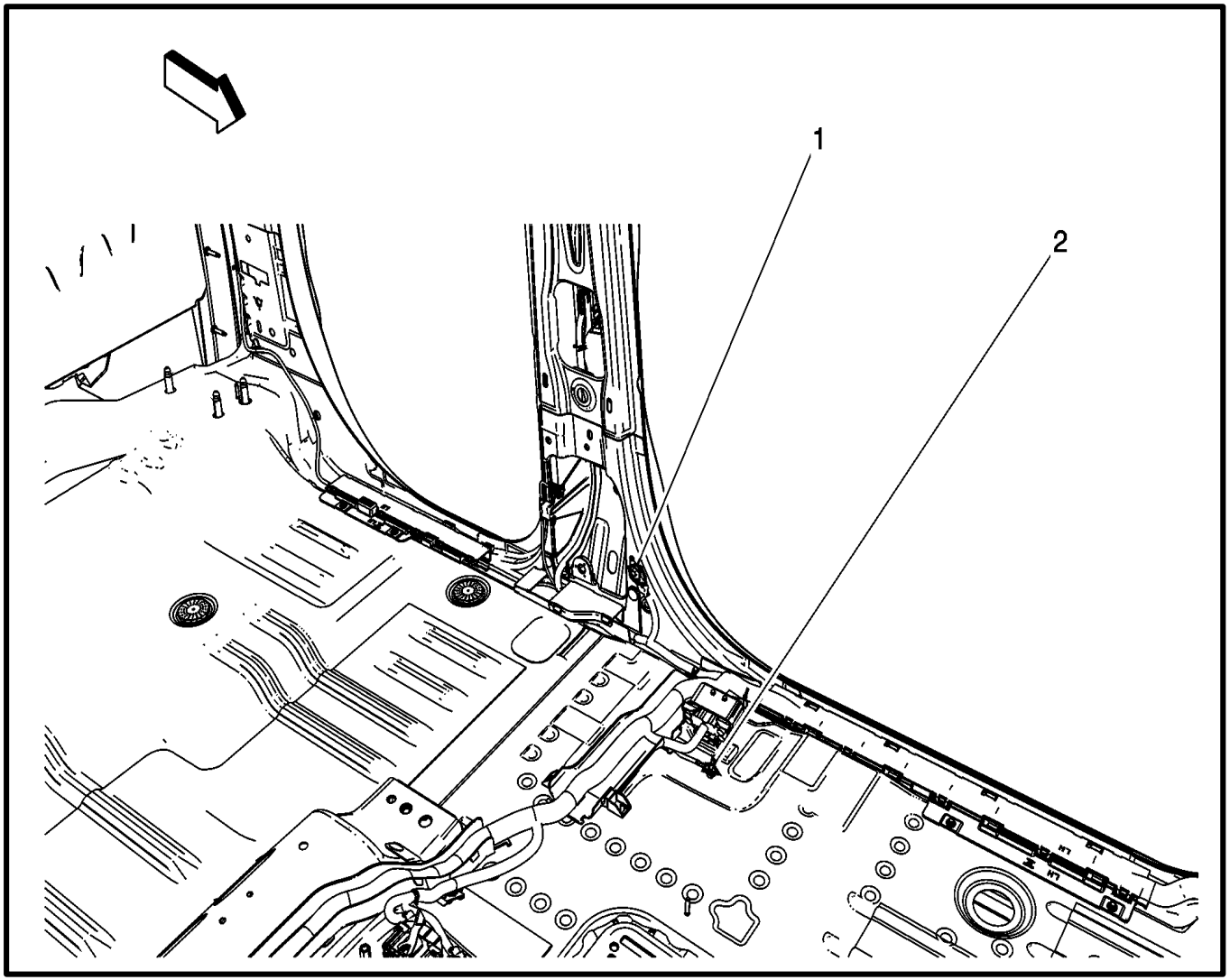
Ground Location Views G140



Ground Location Views G210 and G218



Ground Location Views G311 and G325



Ground Location Views G312 and G327